136-630

TRANSCRIPT OF RECORD.

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1886.

No. ~~347~~. 80

THE BATE REFRIGERATING COMPANY, PLAINTIFF IN ERROR,

vs.

JOSEPH EASTMAN.

IN ERROR TO THE CIRCUIT COURT OF THE UNITED STATES FOR THE SOUTHERN DISTRICT OF NEW YORK.

FILED SEPTEMBER 18, 1886.

SUPREME COURT OF THE UNITED STATES.

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1 UNITED STATES OF AMERICA, *ss:*

The President of the United States of America to the judges of the circuit court of the United States for the southern district of New York, Greeting:

Because in the record and proceedings, as also in the rendition of the judgment of a plea which is in the said circuit court, before you or some of you, between The Bate Refrigerating Company, plaintiff in error, and Joseph Eastman, defendant in error, a manifest error hath happened, to the great damage of the said Bate Refrigerating Company, plaintiff in error, as is said and as appears by its complaint, we, being that such error, if any hath been, should be duly corrected and full and speedy justice done to the parties aforesaid in this behalf, do command you, if judgment be therein given, that then, under your seal, distinctly and openly, you send the record and proceedings aforesaid, with all things concerning the same, to the justices of the Supreme Court of the United States, at the Capitol, in the city of Washington, together with this writ, so that you have the same at the said place, before the justices aforesaid, on the second Monday of October next, that, the record and proceedings aforesaid being inspected, the said justices of the Supreme Court may cause further to be done therein to correct that error what of right and according to the law and custom of the United States ought to be done.

Witness the Honorable Morrison R. Waite, Chief Justice of the Supreme Court of the United States, this 31st day of July, in the year of our Lord one thousand eight hundred and eighty-six, and of the Independence of the United States the one hundred and eleventh.

Seal of U. S. Circuit Court, South. Dist. New York.

TIMOTHY GRIFFITH,
Clerk of the Circuit Court of the United States of America for the Southern District of New York, in the Second Circuit.

Allowed:
WM. J. WALLACE,
Circuit Judge.
July 30, 1886.

2 [Endorsed:] U. S. Supreme Court. Bate Refrigerating Co., plaintiff in error, *vs.* Joseph Eastman, defendant in error. Writ of error. Dickerson & Dickerson, att'ys for plaintiff in error, Temple Court, 5 Beekman St., New York city, N. Y. Service of the within writ is hereby admitted this 4th day of August, 1886. John R. Bennett, attorney for the defendant in error.

[Stamped:] U. S. circuit court. Filed Aug. 4, 1886. Timothy Griffith, clerk.

UNITED STATES OF AMERICA, *Southern District of New York*, } *ss:*

I, Timothy Griffith, clerk of the circuit court of the United States of America for the southern district of New York, in the second circuit, by virtue of the foregoing writ of error and in obedience thereto, do hereby certify that the following pages, numbered from three to four hundred and ninety-one, inclusive, contain a true and complete transcript of the records and proceedings had in said court in the case of The Bate Refrigerating Company, plaintiff in error, against Joseph Eastman, defendant in error, as the same remain of record and on file in said office.

In testimony whereof I have caused the seal of the said court to be hereunto affixed, at the city of New York, in the southern district of New York, in the second circuit, this seventeenth day of September, in the year of our Lord one thousand eight hundred and eighty-six, and of the Independence of the United States the one hundred and eleventh.

Seal of U. S. Circuit Court, South. Dist. New York.

TIMOTHY GRIFFITH, *Clerk.*

3 U. S. Circuit Court, Southern District of N. Y.

BATE REFRIGERATING CO.
vs.
JOSEPH EASTMAN.

Please issue summons in above-entitled action.

DICKERSEN AND DICKERSEN,
Plaintiff's Attorneys.

Office and post-office address, Temple Court, Nos. 3 to 9 Beekman St., New York city, N. Y.

Dated N. Y., March 17, 1884.

To Timothy Griffith, clerk U. S. circuit court, S. D. N. Y.

4 [Endorsed:] U. S. C. C., S. D. N. Y. Bate Refrigerating Company *vs.* Joseph Eastman. Præcipe. Dickersen and Dickersen, pl'ff's att'ys. U. S. circuit court. Filed March 17, 1884. Timothy Griffith, clerk.

5 United States Circuit Court for the Southern Dist. of N. Y.

BATE REFRIGERATING CO.
against
JOSEPH EASTMAN.

To the above-named defendant:

You are hereby summoned to answer the complaint in this action and to serve a copy of your answer on the plaintiff's attorneys

within twenty days after the service of this summons, exclusive of the day of service; and in case of your failure to appear or answer judgement will be taken against you by default for the relief deman-ed in the complaint.

Witness the Honorable Morrison R. Waite, Chief Justice [L. S.] of the Supreme Court of the United States, at the city of New York, this 17th day of March, in the year one thousand eight hundred and eighty-four.

TIMOTHY GRIFFITH, *Clerk.*

DICKERSON AND DICKERSON,
Plaintiff's Attorneys.

Office and post-office address, Temple Court, 3 to 9 Beekman St. New York city, N. Y.

6 [Endorsed:] United States circuit court, southern dist. of New York. Bate Refrigerating Co. *vs.* Joseph Eastman. Summons. Dickerson and Dickerson, pl'ff's att'ys. To the defendant within named: Take notice that upon default judgement will be taken for the sum of $500,000.00 *dollars*, in money, with interest from the 17th day of March, 1884, besides costs. Dickerson and Dickerson, pl'ff's att'ys. U. S. circuit court. Filed March 21, 1884. Timothy Griffith, clerk. 278.

UNITED STATES OF AMERICA, } *ss:*
Southern Dist. of New York, }

I hereby certify that on the — day of ——, 18—, at ——, I personally served the within summons on the within-named defendant, —— ——, by showing —— the same and delivering to and leaving with —— —— true cop- thereof.

—— ——, *U. S. Marshal,*
By —— ——, *Deputy.*

U. S. MARSHAL'S OFFICE,
NEW YORK, *M'ch* 17, 1884.

I hereby depute Wm. T. Smith to serve the within writ.

JOEL B. ERHARDT,
U. S. Marshal.

UNITED STATES OF AMERICA, }
Southern District of N. Y., }

Wm. T. Smith, being duly sworn, deposes and says that he served the within writ upon the within-named defendant as follows:

At his residence, No. 1 E. 72nd St., in the city of New York, on the 17th day of March, 1884, by exhibiting to him the within original and at the same time leaving with him a copy thereof.

W. T. SMITH.

Subscribed & sworn before me this 18th day of M'ch, 1884.
OLL. MARSHALL,
Not. Public, N. Y. Co.

I certify that the within writ was served upon the within-named defendant at the time and in the manner stated in the above affidavit of Wm. T. Smith.
Dated New York, M'ch 21, 1884.
JNS. B. ERHARDT,
U. S. Marshal, So. Dist. of New York.

Entered.

7 United States Circuit Court, Southern District of New York.
At Law.

BATE REFRIGERATING COMPANY, Plaintiff,
against
JOSEPH EASTMAN, Defendant.

The above-named plaintiff complains of the above-named defendant, and alleges—

First. That the plaintiff is a corporation duly organized under and by virtue of the laws of the State of New York and doing business in the city of New York, in said State, and that the defendant is a citizen of said State and doing business in the city of New York, in said State.

Upon information and belief—

Second. That heretofore and before the sixth day of October, A. D. 1864, one Moses J. Kelly, being then a citizen of the United States, was the true, original, and first inventor of a certain new and useful invention, to wit, "certain improvements in air cooling and distributing apparatus," not known or used by others prior to his invention or discovery thereof and not in public use or
8 on sale for more than two years prior to his application for a patent therefor.

Third. That the said Moses J. Kelly made application to the Commissioner of Patents of the United States for the granting of letters patent for said invention, in accordance with the then existing laws of the United States, and complied in all respects with the conditions and requirements of said laws.

Fourth. That thereafter, on the eighteenth day of October, A. D. 1864, letters patent of the United States, signed, sealed, and executed in due form of law and bearing date October 18th, 1864, antedated October 6th, 1864, and numbered 44731, were issued to the said Moses J. Kelly, whereby there was secured to him and to his heirs or assigns for the term of seventeen years from the sixth day of October, A. D. 1864, the full and exclusive right of making, using, and vending the said invention throughout the United States and the territories thereof, as by a certified copy of said letters patent in court to be produced will more fully appear.

Fifth. That by virtue of mesne assignments in writing the plain-

tiff became possessed of all right, title, and interest in and to
9 the said letters patent and in and — the invention therein described, saving and excepting within the States of Missouri, Indiana, and Illinois, which assignments were duly recorded in the Patent Office, at Washington, D. C., as by said assignments or duly certified copies thereof ready in court to be produced will more fully appear.

Sixth. That thereafter, on or about the fourth day of January, 1877, said Moses J. Kelly (the plaintiff herein, the said Bate Refrigerating Company, consenting) having for good and lawful cause surrendered the said letters patent No. 44731 to the Commissioner of Patents, and having made due application thereof, and having in all things duly complied with the acts of Congress in such case made and provided, new letters patent of the United States for the same invention, signed, sealed, and executed in due form of law, were issued to him, the said Moses J. Kelly, on the 24th day of April, 1877, and numbered reissue No. 7643, for the residue of the said term of seventeen years, as by the said reissued letters patent or a duly certified copy thereof ready in court to be produced will more fully appear.

10 Seventh. That by assignment duly recorded the plaintiff subsequently became the sole owner of the aforesaid reissued letters patent and is now the sole owner thereof, and is entitled to all the rights, interests, and privileges thereby secured unto it in and to the said invention in the said reissued letters patent particularly set forth, as by said assignment or a duly certified copy thereof ready in court to be produced will more fully appear.

Eighth. That Joseph Eastman, defendant herein, is the son and successor in business of Timothy C. Eastman, and carries on his said business by and with the support, aid, and concurrence of said Timothy C. Eastman.

Ninth. That heretofore and on the 3rd day of January, 1876, said Timothy C. Eastman and one Wilbur F. Martin did enter into a contract with the plaintiff herein under and by virtue of which said Timothy C. Eastman and said Wilber F. Martin did agree with said plaintiff to pay a certain sum or sums of money as royalty for the use of certain patents, and that thereafter, by a modification of said contract, all the rights and privileges thereunder were
11 vested in and owned by said Timothy C. Eastman, and that by a modification of said contract said reissued patent to Kelly, under which the present suit is brought, was included under and made part of said license, and that said Timothy C. Eastman did receive the benefits of an exclusive license under said reissued letters patent, and that thereafter, the said Timothy C. Eastman refusing to pay the sums of money justly due to the plaintiff herein as a royalty under said reissued letters patent and others, the said plaintiff or its assignee did prosecute a suit against said Timothy C. Eastman, and the supreme court of the city of Brooklyn, county of Kings, State of New York, did adjudge and decree that said Timothy C. Eastman should pay to the plaintiff herein a large sum

of money due to the plaintiff herein as a royalty under said reissued letters patent and under certain other letters patent.

Tenth. That the said Eastman and Martin did owe to the plaintiff herein a further sum or sums of money by reason of their violation of said agreement or infringment of the rights conferred upon
12 the plaintiff herein by the said reissued letters patent and others hereinbefore referred to without paying the royalty due, and that a suit was instituted thereunder against said Eastman and Martin in the court of common pleas for the city and county of New York, and that said Eastman did pay to the plaintiff herein for the damages occasioned to the said plaintiff or by his breach of said contract or agreement a very large sum of money, and that said sums of money so paid to the plaintiff herein by said Eastman for damages and royalties did in the aggregate amount to about three hundred thouand dollars.

Eleventh. That the said Timothy C. Eastman did transfer to his son, Joseph Eastman, parts of the apparatuses previously used by him in his business, and that the apparatuses used by Joseph Eastman, defendant herein, were in part the same apparatuses previously used by Timothy C. Eastman, and under which he paid royalty to the plaintiff herein.

13 Twelfth. That heretofore, on or about the 26th day of July, 1881, his honor Judge Blatchford, in a suit in equity pending in this court, and in which the plaintiff herein was complainant and the defendant herein, Joseph Eastman, was defendant, the suit being based on the reissued letters patent in controversy in this case, granted a preliminary injunction against the said defendant, enjoining him from the further infringement of the said reissued letters patent, and that the preliminary injunction was duly served upon the said defendant, as will more fully appear from the record in said suit.

Thirteenth. That a suit was brought by the plaintiff herein against the Riker's Cold Warehousing Company, Limited, now known as the Produce Exchange Cold Warehouse Company, Limited, doing business in the city of New York; that the said company so sued did offer to take of the plaintiff herein a license under said reissued letters patent, and that thereafter the plaintiff herein, for a valuable consideration, did convey to said company a license to use the apparatus described and claimed in said Kelly reissued letters patent in controversy herein.

14 Fourteenth. That in a suit of equity brought by the plaintiff herein against Lehman Samuels and Levi Samuels, composing the firm of Lehman Samuels and Brothers, defendants, in this court, a final decree was, at the October term, A. D. 1877, issued, in which it was ordered, adjudged, and decreed that said reissued letters patent granted unto Moses J. Kelly, and upon which this action is brought was a good and valid patent, and that the said Moses J. Kelly was the true, original, and first inventor of the improvements described and claimed therein, and that in pursuance of said final decree a perpetual injunction was issued out of this court restraining said Lehman Samuels and Levi Samuels, their attorneys, clerks and

servants, agents and workmen, from making, using, or vending to others to be used, the improvements set forth and claimed in the aforesaid reissued letters patent.

Fifteenth. That in a certain suit in equity brought by the plaintiff herein against Charles Snowden and Patrick McConvill, composing the firm of Snowden & McConvill, in this court, a final
15 decree was, on the first day of December, A. D. 1877, issued, in which it was ordered, adjudged, and decreed that the said reissued letters patent granted to Moses J. Kelly and upon which this action is brought was a good and valid patent, and that, in pursuance of said final decree, the said court did issue a perpetual injunction restraining the said Charles Snowden and Patrick McConvill, their clerks, attorneys, agents, servants, and workmen, from making, using, or vending to others to be used the improvements set forth and claimed in the said reissued letters patent.

Sixteenth. That in a certain suit in equity brought by the plaintiff herein against Samuel F. Woodbridge, defendant, in the circuit court of the United States for the district of Massachusetts the said court did, at the October term, A. D. 1877, issue a final decree, in which it was ordered, adjudged, and decreed that the complainant's said reissued letters patent granted to Moses J. Kelly and upon which this suit is brought was a good and valid patent, and that the said Moses J. Kelly was the true, original, & first inventor of the improvements described and claimed therein, and that,
16 in pursuance of said final decree, the said court did issue a perpetual injunction restraining the said Samuel F. Woodbridge, his clerks, attorneys, agents, servants, and workmen, from making, using, or vending to others to be used the improvements set forth and claimed in the said reissued letters patent.

Seventeenth. That in a certain suit brought by the plaintiff herein against Jacob F. Taylor, defendant, in the circuit court of the United States for the district of Massachusetts the said court did, at the October term, A. D. 1877, issue a final decree, in which it was ordered, adjudged, and decreed that the said reissued letters patent granted to Moses J. Kelly and upon which this suit is brought was a good and valid patent, and that the said Moses J. Kelly was the original, true, and first inventor of the improvements described and claimed therein, and that, in pursuance of said final decree, the said court did issue a perpetual injunction restraining the said Jacob F. Taylor, his clerks, attorneys, agents, servants, and workmen, from making, using, or vending to others to be used the improve-
17 ments set forth and claimed in the said reissued letters patent.

Eighteenth. That in a suit in equity brought by the plaintiff herein, as complainant, in the circuit court of the United States for the third circuit and the district of New Jersey, against George A. Toffey, George C. Toffey, Daniel Toffey, John J. Toffey, and William V. Toffey, defendants, the said court, after full hearings on the pleadings and proofs and on the arguments of the respective counsel, George Gifford, Esq., appearing for the defendants, did, on the 26 day of January, 1881, adjudge that the said letters patent were good and valid; that said Kelly was the first and original inventor

of the improvement therein described and claimed, and that the defendants had infringed upon the same, and that the plaintiff herein was entitled to a perpetual injunction to restrain the defendants, and to an account, as prayed in the bill of complaint, and that said injunction was thereafter issued from said court and duly served upon said defendants.

Nineteenth. That the said defendant, well knowing the premises, but contriving and wrongfully and injuriously intending to injure the said plaintiff and to deprive him of the profits, benefits,
18 and advantages which he might & otherwise would have derived from making, using, or vending the said invention, has unlawfully and wrongfully and without the license of the plaintiff or of its assignors since the 24th day of April, 1877, made and used "air cooling and distributing apparatus" in refrigerating chambers or chill rooms substantially as described and claimed in the aforesaid reissued letters patent.

Whereby the plaintiff has been greatly injured and has lost and been deprived of great gains and profits which it might and otherwise would have derived from the aforesaid invention, to its damage of five hundred thousand dollars, as this plaintiff is ready to maintain and prove.

Wherefore the said plaintiff demands judgment against the said defendant for the said sum of five hundred thousand dollars and the costs of this suit.

BATE REFRIGERATING COMPANY,
By PAUL H. BATE, *Secretary.*

DICKERSON AND DICKERSON,
Att'y- & of Counsel for Plaintiff.

19 STATE OF NEW YORK, }
County of New York, } *ss:*

Paul H. Bate, being duly sworn, deposes and says that he is secretary of the complainants corporation above named; that he has read the foregoing complaint and knows the contents thereof, and that the same is true of his own knowledge, except as to the matters therein stated to be alleged upon information and belief, and as to those matters he believes the same to be true.

PAUL H. BATE.

Subscribed & sworn to before me this 17th day of March, 1884.
GEO. H. EVANS,
Notary Public (13), *N. Y. Co.*

20 [Endorsed:] U. S. circuit court, southern dist. of N. Y. At law. Bate Refrigerating Company, plaintiff, against Joseph Eastman, defendant. Complaint. Dickerson and Dickerson, attorneys for plaintiff, Temple Court, Nos. 3 to 9, Beekman St., New York, N. Y. U. S. circuit court. Filed March 18, 1884. Timothy Griffith, clerk.

U. S. OF AMERICA, }
Southern Dist. of N. Y. }

Wm. T. Smith, being duly sworn, deposes and says that he served the within complaint upon the within-named defendant as follows: At his residence, No. 1 E. 72nd St., in the city of New York, on the 17th day of March, 1884, by exhibiting to him the within original and at the same time leaving with him a true copy thereof.

W. T. SMITH.

Subscribed & sworn before me this 18th day of March, 1884.

C. C. MARSHALL,
U. S. Com., Not. Pub., N. Y. Co.

21 United States Circuit Court, Southern District of New York.

BATE REFRIGERATING COMPANY, Plaintiff, }
vs. } At Law.
JOSEPH EASTMAN, Defendant. }

And now comes the defendant, by John R. Bennett, his attorney, and defends the alleged wrong and injury complained of against him in the said plaintiff's complaint, and says that he is not guilty of the trespass complained of, either in whole or part, in the manner and form specified in said complaint, and for answer thereto denies generally and specifically each and every, all and singular, the allegations contained in said plaintiff's complaint filed herein, and of this the defendant puts himself upon the country.

And, further answering, defendant more specially denies, viz:

1st. Plaintiff's title and ownership to said Kelly reissued letters — No. 7643, of April 24, 1877, and its right to recover thereunder.

22 2nd. That letters patent No. 44731 were surrendered, as required by law, at and prior to the time of the grant and issue instead thereof of said reissued letters patent No. 7643.

3rd. That said reissued letters patent No. 7643, of April 24, 1877, are for the same invention as said original letters patent No. 44731, — are for the same invention as that patented in and by said original letters patent No. 44731.

4th. That the surrender of said original letters patent No. 44731 was for good and lawful cause.

5th. That the said Kelly reissued letters patent No. 7643 was included in or ever made a part of any contract or license between the plaintiff herein and one Timothy C. Eastman, or that the said Timothy C. Eastman ever received the benefit of an exclusive license under said patent or any benefit whatsoever from, under, or by reason of said patent.

23 And as to each and every of the foregoing the defendant puts himself upon the country.

And, further answering, defendant says—

1st. That this action is barred by the statu-e of limitation.

2nd. That neither said Kelly's original or reissued letters patent

describes and claims legal patentable subject-matter, and that the alleged invention of the said Kelly was not patentable.

3rd. That the said Kelly and the plaintiff herein forfeited all right to surrender and reissue said original patent No. 44731 by reason of their long delay.

All of which the defendant herein is ready to verify and maintain.

JOHN R. BENNETT,
Attorney for Defendant, 237 *Broadway, N. Y.*

24 [Endorsed:] No. —. Sess. 18. United States circuit court, so. district of N. Y. At law. Bate Refrigerating Co. *vs.* Joseph Eastman. Answer. John R. Bennett, solicitor for def't. U. S. circuit court. Filed June 2nd, 1884. Timothy Griffith, clerk.

25 United States Circuit Court, Southern District of New York.

BATE REFRIGERATING COMPANY, Plaintiff,
vs.
JOSEPH EASTMAN, Defendant. } At Law.

And the said plaintiff, as to the said pleas of the said defendant by him herein pleaded, of which he has put himself upon the country, doth the like.

And the plaintiff, as to the said plea of the defendant in the words following, to wit, "that this action is barred by the statu-e of limitation," denies the same, and of this the plaintiff puts itself upon the country.

And the plaintiff, as to the said plea of the defendant in the words following, to wit, "that neither said Kelly's original or reissued letters patent describes and claims legal patentable subject-matter, and that the alleged invention of the said Kelly was not patentable," denies the same, and of this the plaintiff puts itself upon the country.

26 And the plaintiff, as to the said plea of the defendant in the words following, to wit, "that the said Kelly and the plaintiff herein forfeited all right to surrender and reissue said original patent No. 44731 by reason of their long delay," denies the same, and of this the plaintiff puts itself upon the country.

DICKERSON AND DICKERSON,
Attorneys for the Pl'ff, No 3 *Beekman St., New York City.*

[Endorsed:] At law. Bate Refrigerating Co., plaintiff, *vs.* Joseph Eastman, defendant. Replication. Dickerson and Dickerson, attorneys for pl'ff, Temple Court, 3 to 9 Beekman —, New York, N. Y. Due service of a copy of the within is hereby admitted. Dated —. Original. U. S. circuit court. Filed August 11, 1884. Timothy Griff., clerk.

27 United States Circuit Court, Southern District of New York. At Law.

BATE REFRIGERATING CO., Plaintiff,
vs.
JOSEPH EASTMAN, Defendant.

It is hereby stipulated by and between the attorneys of record for the respective parties thereto that the above-entitled cause be tried before his honor Judge Nathaniel Shipman without a jury.

New York, May 1st, 1885.

DICKERSON AND DICKERSON,
Attorneys for Pl'ff.

JOHN R. BENNETT,
Attorneys for Defendant.

28 [Endorsed:] U. S. circuit court, southern district of New York. At law. Bate Refrigerating Company, plaintiff, *vs.* Joseph Eastman, defendant. Stipulation waiving jury. Dickerson and Dickerson, att'ys for pl'ff, Temple Court, 3 to 9 Beekman —, N. Y. city, N. Y. U. S. circuit court. Filed Jan. 20, 1886. Timothy Griffith, clerk.

29 Circuit Court of the United States, Southern District of New York. At Law.

BATE REFRIGERATING CO., Plaintiff,
vs.
JOSEPH EASTMAN, Defendant.

This action having come on to be heard before his honor Judge Nathaniel Shipman without a jury at a term of the above-entitled court, held, in the city of New York, State of New York, on the 21st day of May, 1885, and his honor having, on the 12th day of June, 1885, on motion of defendant, directed that judgement be entered for the defendant herein for reasons set forth in the opinion of the court filed herein, and the costs of the defendant having been adjusted at the sum of fifty-four ($54.00) dollars, it is now, on motion of John R. Bennett, Esq., att'y for defendant—

Ordered, That judgement as directed by the court herein, be entered in behalf of the defendant herein for the sum of fifty-four ($54.00) dollars, and that he — execution therefor.

N. SHIPMAN, *Judge.*

30 [Endorsed:] U. S. circuit court. Filed April 22, 1886. Timothy Griffith, clerk.

31 United States Circuit Court, Southern District of New York.

BATE REFRIGERATING CO.
vs.
JOSEPH EASTMAN.

The issues in this action having been brought on for trial before the Honorable Nathaniel Shipman, acting circuit judge, without a jury, at a circuit court held on the 21st, 22nd, and 23rd days of May, 1885, and on the 8th, 9th, and 10th and 12th days of June, 1885, and the issues having been tried, and the court having, on the 12th day of June, 1885, on the motion of the defendant, directed that judgement be entered in behalf of the defendant, and his costs having been adjusted at $54.00, now, on motion of John R. Bennett, Esq., attorney for the defendant, it is adjudged that the said defendant having judgement against the plaintiff upon the issues in this action for the sum of fifty-four ($54.00) dollars, his taxed costs, and that he have execution therefor.

Judgement signed this 23rd day of April, 1886.

JOHN A. SHIELDS,
Deputy Clerk.

32 [Endorsed:] U. S. circuit court, southern dist. of N. Y. Bate Refrigerating Co. *vs.* Joseph Eastman. Judgment-roll. 10 o'cl'k a. m. U. S. circuit court. Filed April 23rd, 1886. Timothy Griffith, clerk.

33 United States Circuit Court, Southern District of New York.
At Law.

BATE REFRIGERATING COMPANY, Plaintiff,
against
JOSEPH EASTMAN, Defendant.

Bill of Exceptions.

Be it remembered that on the 17th day of March, 1884, the plaintiff herein, The Bate Refrigerating Company, a corporation organized under the laws of the State of New York and doing business in the city of New York, in said State, filed in this court its complaint against the defendant, Joseph Eastman, then a citizen of the State of New York and doing business in the city of New York, in said State; that on the 21st day of March, 1884, the defendant, Joseph Eastman, was served with a summons herein; that on the 2nd day of June, 1884, the defendant, Joseph Eastman, filed his answer herein, and that on the 11th day of August, 1884, the plaintiff, The Bate Refrigerating Company, filed its replication to the said answer of the defendant, Joseph Eastman, and thereupon issues in the action were made and joined by and between the parties by the said pleadings, and thereafter, on the 2nd day of December, 1884, the defendant, Joseph Eastman, gave notice under the general issue of certain special matters of defence herein; to all of which pleadings and notice reference is hereby made.

34 And now, at the present term of this court, to wit, on the 21st day of May, 1885, by and before the Honorable Nathaniel Shipman, United States district judge for the district of Connecticut, sitting and holding this court, a jury having been waived by the consent of both parties to the action (as appears from the stipulation, a copy of which is attached to this bill of exceptions), were tried the issues between the plaintiff and the defendant in this action, and the trial thereof was continued from day to day until and including the 23rd day of May, 1885, then adjourned to the 8th day of June, 1885, and then continued from day to day until and including the 10th day of June, 1885, the plaintiff being represented by its counsel, Edward N. Dickerson and Edward N. Dickerson, Jr., Esq's, and the defendant by his counsel, Roscoe Conkling and John R. Bennett, Esq's.

And at the trial the plaintiff, in support of his action, introduced the following proofs, to wit:

The following stipulation made and entered into by and between the attorneys of record for the respective parties hereto on the 21st day of May, 1885, was read and offered in evidence in this case by the counsel for the complainant and marked "Complainant's Exhibit Stipulation."

United States Circuit Court, Southern District of N. Y.

BATE REFRIGERATING COMPANY } At Law.
vs.
35 JOSEPH EASTMAN. }

It is hereby stipulated and agreed by and between the attorneys for respective parties as follows, viz:

1st. Defendant's counsel agrees to waive all proof of corporation.

2nd. To waive proof of plaintiff's title to Kelly reissue.

3rd. To waive proof of the execution of a certain agreement dated Jan. 3, 1876, between the plaintiff and Timothy C. Eastman and Wilbur F. Martin; that subsequently said Martin assigned all his interest in said contract to said Timothy C. Eastman; that said T. C. Eastman paid said Bate Refrigerating Company, under said contract, about $300,000; that said T. C. Eastman, under said contract, constructed and used refrigerators which contained or embodied some of the improvements described in U. S. letters patent No. 146,980, dated Feb. 3, 1874, granted John Jones Bate, and the reissues thereof, which form of apparatus is shown by the model marked "Ex. Bate Refrigerator."

4th. To waive proof of the proceedings had in the case of Paul H. Bate *vs.* Timothy C. Eastman, in supreme court, Kings county, N. Y., and the findings entered therein July 31, 1880.

5th. To waive proof as to certified Patent Office model of Kelly apparatus.

36 Admits—

1st. That during the period from May, 1879, to Oct., 1881,

that the defendant was engaged in the business of transporting dressed meat to Europe in foreign vessels sailing under the British flag and registered under the laws of Great Britain, and that in his said business he used on board the English steamship Arizona a Bell-Coleman refrigerating apparatus, such as shown by the model, "Ex. Bell-Coleman Compressed Air Refrigerating Apparatus."

2nd. That during the period from May, 1879, to Oct., '81, he shipped to Europe in the Bell-Coleman compressed air refrigerating apparatus, in which no external air was used, on board European steamships sailing under the flag of Great Britain 62,671 ½ carcasses of beef and about 3,000,000 pounds of mutton, equal to 5,300 carcasses of beef, such figures being produced, subject to verification.

3rd. That Joseph Eastman, the defendant herein, in June, 1879, succeeded his father, T. C. Eastman, in the business of transporting dressed meat from New York to England and selling the same there, and that his father prior to that time had made him an absolute gift and present of $75,000 in cash, which thereupon became the sole and individual property of the said Joseph Eastman, to use and enjoy as he might desire; that subsequently said Joseph Eastman did, as matter of fact, employ said $75,000 in carrying on his said business of transporting fresh meat to Europe.

It is agreed—

37 1st. That either party may use uncertified copies of U. S. and English letters patent or any Patent Office papers or of court records.

2nd. That either party may refer to, read in evidence, and use upon the trial of this action the records in the case of the Bate Refrigerating Company *vs.* George A. Toffey *et al.*, in the U. S. circuit court for the district of New Jersey, with the same force as though taken herein, and the printed briefs and arguments filed therein, with the understanding, however, that if demanded by the defendants, John Jones Bate and Paul H. Bate, witnesses examined in said case will be produced for further cross-examination upon their testimony as given in said cause above referred to.

Complainant admits—

First. That the defendant herein never used in his business of transporting dressed meat to Europe a refrigerating apparatus of the exact form and construction shown by the model, "Exhibit Bate Refrigerator," and that he never used a refrigerating apparatus of the form and construction used by T. C. Eastman under his said contract with the Bate Refrigerating Company, of January 3rd, 1876.

Second. That Timothy C. Eastman never used a compressed air refrigerating apparatus of any kind, and that he never used in his business of transporting meat to Europe a compressed air refrigerating apparatus such as used by Joseph Eastman.

38 Third. That on April 28, 1879, T. C. Eastman notified the Bate Refrigerating Company that thereafter he should discontinue the use of the "Bate refrigerator" or any refrigerator containing any feature covered by the patents owned by the Bate Company, and that thereafter and so long as he continued in the business he used

the "brine process" of refrigeration, which did not infringe the Kelly patent or any other patent owned by the said Bate Refrigerating Company, and that at the time the said Eastman retired from business he was using brine refrigerators exclusively; that after the said Eastman had given said notice and commenced the use of the brine process of refrigeration suit was brought against him by the Bate Refrigerating Company for breach of contract, claiming damages in the sum of $2,000,000, and claiming that the said contract with Timothy C. Eastman provided that "he was to continue to pay the company the royalties due to it so long as the business proved profitable," and the company therefore claimed that, "whether the apparatus used by Eastman was or was not an infringement of the letters patent under which he was licensed, said royalties were nevertheless due."

Fourth. That at the time Joseph Eastman, the defendant herein, engaged in the business of transporting dressed meat to Europe the following-named parties were largely engaged in the same business and using the following-named processes of refrigeration on board European vessels, viz:

Toffey, at Jersey City, using the ice process—*i. e.*, ice-box, fans, and conduits.

39 Martin, Fuller & Company, of Philadelphia, Pa., using the ice process—*i. e.*, ice-box, fans, and conduits.

Sherman & Gillette, using the brine process.

Hollis, of Boston, using the brine process.

Swift, of Chicago and Boston, using the brine process.

Hammond, of Chicago and Boston, using the brine process; and that the brine process used by all these parties did not infringe the Kelly patent or any patent owned by the Bate Refrigerating Company.

Fifth. That at the time Joseph Eastman, the defendant herein, engaged in the business of transporting dressed meat to Europe the brine process, which was not an infringement of the Kelly patent, was being largely and successfully used for the transportation of dressed meat to Europe, and that meat was successfully transported to Europe by that process of refrigeration.

Sixth. That Joseph Eastman, the defendant herein, has not used the Kelly refrigerating apparatus or any other refrigerating apparatus claimed to be an infringement of the Kelly patent, except upon European steamships in transporting meat from New York to England.

Seventh. That since 1881 no one has, to the knowledge of the plaintiff, used in the transportation of dressed meat to Europe a refrigerating apparatus consisting of an ice-box, fan, and conduits,

40 and that such form and construction of refrigerating apparatus has gone entirely out of use, so far as concerns the transportation of dressed meat to Europe.

Eighth. That the Bate Refrigerating Company, the plaintiff herein, has never been engaged in the business of transporting dressed meats to Europe, but that said company did, in the year

1875, make three separate shipments of dressed meat to England upon European steamships by way of experiment.

Ninth. That the Bate Refrigerating Company, the plaintiff herein, purchased the entire right, title, and interest in and to the Kelly original patent from Moses J. Kelly, the patentee, paying therefor the sum of $250, the said Kelly reserving to himself the States of Illinois, Missouri, Indiana, and one other Western State, and that thereafter and during the month of May, 1877, the said Bate Refrigerating Company purchased the remaining four States from the said Kelly, paying therefor the sum of $1,000.

Tenth. That A. S. Lyman, of New York city, did, long prior to the date of the Kelly patent, construct and use refrigerating apparatuses consisting of the combination of an ice-chest, fan, and conduit; that in 1852 the said Lyman constructed, used, and operated a refrigerating car such as shown in the drawing annexed hereto, marked Lyman car No. 1; that in 1853 he constructed, operated, and used two refrigerating cars such as shown by the drawing annexed hereto and marked Lyman cars of 1853, and that said refrigerating cars were publicly exhibited and used; that in 1854 said Lyman constructed, operated, and used a refrigerating car
41 substantially the same as shown by the drawing annexed hereto and marked Lyman car of 1854; that for the construction, mode of operation, and extent of use of the said Lyman cars of 1852, '53, and '54, reference is made to the testimony of the said Lyman and others, contained in the records of the case of this plaintiff against George A. Toffey *et al.*, in the U. S. circuit court for the district of New Jersey; that said Lyman did, during the years 1853, 1854, 1855, and 1856, construct and put into public use refrigerators such as shown and described in a caveat filed by him August 20th, 1852, copy of which is hereto annexed; also as shown and described by him in an application for letters patent filed September 21, 1854.

Eleventh. The plaintiff waives all claim for damages as against the defendant by reason of the defendant's use of the Bell-Coleman compressed air refrigerator after it was so changed as to make use of or take in the external air exclusively.

The foregoing stipulation is made subject to all rights of objection and exception by each of the parties thereto as to competency, relevancy, admissibility, and effect of the matters contained therein as testimony or evidence in this action.

N. Y., May 21, 1885.

JOHN R BENNETT, *Att'y for Def't.*
DICKERSON & DICKERSON,
Att'ys for Pl'ff.

42 The counsel for complainant offered in evidence a copy of U. S. letters patent No. 7643, reissued April 24th, 1877, to Moses J. Kelly, for an "improvement in air cooling and distributing apparatus," the same being the letters patent in controversy in this case, and the same was marked "Complainant's Exhibit Kelly Reissue No. 7643, May 21, 1885."

Mr. CONKLING: We object to the reissue, not that we suppose that your honor is going to pass upon the question with the testimony as it is this moment, but because we want at the proper time to interpose our objections. The original patent, which my associate will find in a moment, contains one claim and only one. The reissue, as your honor has seen, contains five claims. In what stands in the reissue as the fifth claim there is imported for the first time into the claim words which I wish the stenographer to note, so that, should they be referred to again, there will be no confusion in regard to them. The words are, "in an air cooler or apparatus for cooling carcasses," etc.

We say that if those words are governing words or influential words, if they change, legally or materially, the claim, then the reissue is void within the recent cases, the first of which was Miller *vs.* Brass Co. If they do not change, materially and legally, the claim, as Judge Nixon, in so much of that particular judgment as has been read, affirms, and as we think appears already for the purposes of our objection, then clearly the whole claim was anticipated and was old. I will illustrate it otherwise. If this
43 claim is to be read as a claim at large, in the abstract, for this apparatus, to be used anywhere—out of doors or in the house or wherever set up—that, as we submit, was old and well known. If, on the other hand, this reissue claim is to be read not as that, but as a claim for this apparatus, with a certain adjustment located, adjusted, and adapted in a particular way, so as to make of itself a combination and arrangement, then the reissue is void. In the Toffey case, to which reference has been made, which preceded the judgment of the supreme court in the — case and in other cases (and where no such point, bye-the-bye, was raised), it was assumed that this claim was just as well standing in the reissue as it has stood in the original; and, as I need not say to your honor, that question is here now, just as intact and perfect for us as if, anterior to those decisions, no court had ever accepted a reissue as valid and unchallenged. So that we object to this patent, and especially to the fifth claim, as incompetent and inadmissible first; and, secondly, we object to it because, if it enlarges or materially changes the claim of the original patent, it is void. I think that I have made sufficienty definite what me mean—that we do not expect your honor to pass upon this now—but we think it is safe for us now to make the point as a question of evidence, and then if your honor overrules it we have our exception, and when we come to the effect of the evidence, of course, we may have something more to say about that.

The COURT: I will overrule the objection.

44 Mr. CONKLING: We note an exception.

Mr. DICKERSON, Jr.: Your honor has noted the admission in regard to the title, and we therefore do not offer to put in our assignments in view of that admission.

Mr. CONKLING: I ask the stenographer to note that our objection is made in view of the fact that the declaration in this case and the demand for damages is upon the fifth claim. I take it for granted

that that is understood, but I say it now in order that it may be noted on the record in connection with our objection.

Mr. DICKERSON, Jr.: We shall not press anything except on the fifth claim. It may be that the other claims are either the same or perhaps narrower in construction, but if we cannot prevail on the fifth, then it is very clear that we cannot prevail on the others.

45 *Testimony of Henry L. Brevoort.*

HENRY L. BREVOORT, sworn and examined as a witness in behalf of the plaintiff, testifies as follows:

Direct examination by Mr. DICKERSON, Jr.:

Q. What is your age?

A. Thirty-six.

Q. What is your profession?

A. I am an engineer.

Q. Will you state whether you have had occasion in the practice of your profession to examine patents, with reference especially to refrigerator patents; and, if so, how much?

A. I have. I have been engaged perhaps in a dozen cases relating to refrigerators.

Q. Have you had occasion heretofore to give testimony in United States courts as an expert witness in aid of the court?

A. Yes; in about three or four hundred cases.

Q. Have you made any personal examination of refrigerator apparatus and any study of such apparatus in operation?

A. I have.

Q. Have you read and do you understand the reissue letters patent to Moses J. Kelly, No. 7643, being the patent here in controversy?

A. I have very frequently read it, and I think that I understand it.

Q. Will you state to the court, briefly, wherein the invention of that patent consists, and especially the invention which is pointed out in the fifth claim? And you may generally explain to the court the entire apparatus.

Mr. CONKLING: We renew to this testimony the objections
46 that we made with respect to the patent, and we also object to this testimony as incompetent and immaterial of itself.

The COURT: The objection is overruled.

Mr. CONKLING: And we except.

A. I understand the Kelly patent to describe an apparatus for cooling the air in such situations as are referred to in the patent; for example, slaughtering establishments, railroad cars, grain bins, or holds of vessels, and it is used there to cool the air in the holds of a vessel. It is to be used as a means of cooling the air, to wit, as is described in the patent; and there is an ice-box; and there is to be a fan to cause the air to move; and there is referred to, in this fifth claim, the fact that there are to be a series of pipes, the object being to circulate the air and make it circulate all over the place to

be cooled, so that there shall not be portions of this space in which the air shall not circulate. By having the upper openings, as shown in Fig. 1 of the patent, if that device was placed and intended to be placed in the hold of a ship or in an apartment to be cooled, every portion of the air in that room would be moved past in contact with the ice and cooled, and have any moisture it might contain deposited upon the ice, and then forced outwards again, through the openings, in the distributing tubes. Thus the air is made to do its work of cooling whatever may be in the room; is then passed again over the ice, depositing its moisture, and so again passes out through the distributing tubes to cool whatever substance there may be in the chamber that it is desired to have cooled. The fifth claim refers to the apparatus which causes the air to circulate, to wit, the
47 fan and blower, with the system of tubes and apparatus to cool the air, and consisting in part of the ice-chest. The patent shows two forms of ice-chests, and says that either form may be used in connection with the invention referred to in that claim.

Mr. DICKERSON, Jr.: We now offer in evidence the model of the defendant's apparatus which is before your honor, and which is marked "Exhibit Bell-Coleman Compressed Air Refrigerating Apparatus."

Mr. BENNETT: We admit that Mr. Eastman, the defendant, used an apparatus such as is shown by that model on board the steamship Arizona for the transportation of meat from the port of New York to various ports in England during the period from May, 1879, to October, 1881.

Q. Have you examined that model, and do you understand it?

A. I have, and understand it.

Q. And have you examined the original of the apparatus of which that is the model?

A. I have. I was on board the Arizona in 1881 and examined it carefully.

Q. And do you understand its method of construction?

A. I do.

Q. Was the apparatus when you examined it marked with the mark of a patent, and having reference to it?

A. It was.

Mr. DICKERSON, Jr.: I offer in evidence the patent to J. J. Coleman, No. 226,281, of April 6th, 1880; and we propose to show by this witness that the apparatus used by the defendant was patented to Mr. Coleman in that patent and was marked with the number and date of that patent.

Mr. CONKLING: Is this a foreign or American patent?

Mr. DICKERSON, Jr.: It is a United States patent.

Mr. BENNETT: We object to that as being immaterial to
48 the subject of the matter in controversy.

Mr. DICKERSON, Jr.: We offer it as an explanation of the apparatus made by the patentee. There is no dispute that the ap-

paratus is being operated under that patent. That is, in fact, covered by the stipulation.

The COURT: I think I will admit it.

Mr. CONKLING: We object to it as incompetent and immaterial.

Q. I hand you now Coleman's patent of April 6th, 1880, No. 226,281. Will you state if that is a patent for the defendant's model before you—whether that is the patent marked upon the original apparatus which you saw?

A. That is the patent marked on the apparatus.

Q. And does it describe the apparatus before you, which is shown in the model?

49 A. In substance it does.

Q. Will you please compare the apparatus shown in the Defendant's Exhibit Model with the apparatus described in the Kelly reissue and claimed in the fifth claim?

A. The apparatus of the defendant consists of a chamber or receptacle formed in the hold of a vessel, in which place the carcasses are to be hung. The air which is to be used to cool the carcasses is cooled by being compressed, then washed with streams of water to take out the heat, and then, through a number of apparatuses which I need not describe, the air is allowed to expand and is forced out by the pumps through a large number of openings, each one of which consists of a pipe leading from the main air channel, one on either side of the apparatus in which the air is being cooled. In this apparatus of the defendant there is shown, first of all, the compartment in which the carcasses are to be hung. There is next a blowing engine which blows the air out through the openings into the compartment, and there is a suitable apparatus—not perhaps an ice-chest, but the equivalent of it—for cooling the air, the method used in the defendant's apparatus being an old and well-known equivalent of ice or other cooling medium for air; and there is the system in the hold of the ship, shown by this model, for distributing the air from the tubes which are under the deck and each of which reaches to a different portion of the apparatus, so that when the air is blown out through these tubes and again drawn back to the apparatus there is a perfectly equable circulation of air all over the apparatus. No part of the place in which the carcasses are hung is left as a dead space from which or into which air does not

50 pass. All the air in the apparatus is in motion, flowing out through the tubes and then flowing back to be cooled and to have the moisture deposited and then sent back as pure cold air to do its work. I think it is clear that the defendant's apparatus has the equivalent of the parts referred to in the fifth claim.

Q. Do you understand that the Kelly apparatus as described in the patent was adapted to be used in a place or apartment to be cooled?

A. I do. I understand it from the patent; and I understand that it practically could not have been used in any other way.

Q. In the state of the art as it existed in the year 1864 was such

apparatus ordinarily used in closed chambers, or were they used to introduce fresh air from the atmosphere?

Mr. CONKLING: To that question specially we object, first, as incompetent, and, second, as not being the subject of such an opinion as the question implies.

Mr. DICKERSON, Jr.: I will withdraw that question and put another, if it is objected to as being leading.

The COURT: The question is withdrawn, as I understand.

Q. Are you familiar, from your investigation and reading,
51 with the state of the art as it existed in 1864 with reference to refrigerating apparatus employing ice?

A. I am.

Q. In view of the state of the art as it existed at that time and the construction of the Kelly patent, is it or not your opinion that such apparatus was intended to be used and that the instruction in the patents is sufficient to indicate to the user that it was intended to be used and that it should be placed in a closed chamber?

Mr. CONKLING: I object to that as incompetent; second, as not being the subject for an opinion such as the question calls for.

The COURT (to plaintiff's counsel): You do not ask him to construe the patent?

Mr. DICKERSON, Jr.: No; I do not ask him for that; I simply ask him for his knowledge of the state of the art in connection with that class of apparatus. I do not care to go beyond that.

52 The COURT: Mr. Conkling does not object to that, as I understand him.

Mr. DICKERSON, Jr.: Then I will withdraw that question and put another, as that is all that I desire to bring out.

Q. From your investigation and knowledge of the state of the art in 1864, will you please state in what way such a machine as that shown and described in the Kelly patent was used with reference to the question of an enclosure?

A. Mr. CONKLING: That is not at all an inquiry as to the state of the art; it is exactly what I think it excludes.

The COURT: Suppose you ask him what the state of the art was in 1864 as to the construction of refrigerating devices with reference to their being used in an inclosure.

Mr. DICKERSON, Jr.: That is just what my present question is intended to cover.

The COURT: Ask him what was the state of the art in
53 1864 with regard to refrigerating devices, as to their being enclosed.

Mr. DICKERSON, Jr.: I will put it in that form and withdraw my question.

Mr. CONKLING: If it relates to any other year than 1864 we object to it; if limited to that year we do not.

Q. You have heard his honor's question and you can answer that instead of my own.

A. Apparatuses of this nature were used in an enclosure. Apparatus of the nature of that described in the Kelly patent were used in an enclosure.

Cross-examination by Mr. BENNETT:

Q. I believe that you have testified that prior to this case you have given evidence in three or four cases with reference to this same subject. Will you name the various cases where such has been the case?

A. I do not remember the titles of the cases, but I have been in two or three suits, I think, relating to this patent.

Q. Were you in the case of the Bate Refrigerating Company against Martin, Fuller & Company upon this same patent now in controversy?

A. I do not remember whether that was the title of the case I was in or not.

Q. You did make an affidavit in several cases in which an ice-box, and fans, and conduits were claimed to be infringed, did you not?

A. I did.

54 Q. Do you remember of having made an affidavit for use in a case in Philadelphia in which you had under consideration a refrigerating apparatus consisting of ice-box, fan, and distributing conduits?

A. I do not remember anything about it now; possibly.

Q. Do you remember ever having testified that the Kelley patent, and especially this fifth claim, would be infringed by an apparatus consisting of ice-box, and fan, and one inlet conduit, and one outlet conduit?

A. I do not remember having so testified.

Q. Would such a construction of apparatus be an infringement, in your opinion, of this fifth claim of the Kelly patent?

A. It might be under certain unusual construction of chambers, but not under such a construction of chamber as is found here.

Q. Under what construction of chamber would it be?

A. If you can imagine that you had a long cylindrical chamber like a pencil, both ends being open, at one end the air going in and at one end coming out, such a construction might be an infringement.

Q. And such a construction, in your opinion, would be within the fifth claim of the Kelley patent, as you construe it?

A. I suppose that it might be. I am only giving my opinion now.

Q. I am only asking for your opinion, of course. You have referred, during the course of your examination, to the state of the art, and you have said that the state of the art showed the use of an apparatus in an enclosed chamber. Will you tell us the various occasions prior to 1864, or the date of this Kelly patent, where such was the case?

55 A. Cooling apparatus inclosed chambers have been used in

cars and in other situations. I do not remember now all that I have seen.

Q. Then it was not new at the date of the Kelley invention to have a refrigerating apparatus consisting of fan, ice-box, and one or more conduits, so as to permit the air being taken in and thrown out and placing it in an enclosed apartment?

A. As I remember, Kelley was not the first man who used a fan with an ice-box and let the air in and out.

Q. Tell us who was the first, in your opinion or so far as your knowledge extends, to construct and use such an apparatus.

A. I suppose that Lyman used an apparatus having the features which you refer to. He had a fan and he had an ice-box and he had openings.

Q. Describe those openings.

A. He had a hole to let the air out and a hole at which to take the air in.

Mr. DICKERSON, Sr.:

Q. Mr. Bennett does not quite make his question plain as to whether he is referring to a publication or to a knowledge of the apparatus in use.

Mr. BENNETT: I am referring to whatever the witness refers to. I am trying to get the knowledge upon which he makes that statement.

Q. State whether, prior to Kelley's time, you knew it to be a fact that an apparatus consisting of a fan, ice-box, inlet and outlet openings had been used within an enclosed compartment.

A. I knew that the Lyman car had been used.

56 Q. Is it not the fact that in that construction the inlet and outlet or the two openings were at opposite ends to each other?

A. I do not recollect the patent now. I have not seen it for some time.

Q. Do you know of an apparatus, prior to Kelley's time, consisting of ice-box, fan, and two openings, the two openings being at opposite ends of the rooms, the one for taking the air in and the other for drawing it out after it had been in contact with the ice?

A. I do not recall anything to my mind.

Q. The Lyman apparatus would cause an equable distribution of air, would it not?

A. No; it would not.

Q. Why not?

A. Because, as I remember the apparatus as shown by the drawing, it did not have a sufficient number of openings to equably distribute the air over the car. It had other objections also.

Q. Is that simply a matter of opinion of yours?

A. It is a matter of opinion founded upon what I have seen in practice. I have not seen the Lyman car run.

Q. You may state to us how many openings it would be necessary to have in the Lyman construction, as you say it was used, to cause an equable distribution of air?

A. It might have twenty or thirty, reaching to different parts. I cannot swear to the number. I know that that number would probably have done it if they had been put in properly.

57 Q. You think that twenty or more would have been enough?

A. I should say so.

Q. Would not ten be enough, in your opinion?

A. I do not know; I cannot swear to any particular number.

Q. Have you tried it?

A. I have not tried it; no.

Q. Have you ever, as matter of fact, tried to ascertain the temperature of an apparatus consisting of ice-box, fan, and conduits, one conduit extending to the far end of the room and opening into the opposite end of the room, so as to be able to state whether or not they would cause an equable distribution of air?

A. I have not wasted meat in trying experiments like that, and I do not propose to try them.

Q. Then you do not know anything about it, whether it would or would not?

A. No; I do not know, as a matter of fact, that there are letters down-stairs in the post office, but I am pretty sure that there are.

Q. Referring now to your knowledge of the Lyman apparatus, how many openings did it have?

A. It either has one or two; I have forgotten which.

Q. It may have had two?

A. I think it had two; I am not sure.

Q. How many inlets had it?

A. I think it had one.

Q. There was, as I understand you, only one inlet for taking the air into the fans?

A. As I recollect it.

58 Q. And two outlets for permitting the air to go off after it passed into contact with the ice?

A. As I recall it, it may be so. I do not remember the patent, and have not got it in front of me. I have not seen the patent for some little time.

By Mr. CONKLING:

Q. But that is as you now remember it?

A. Yes.

By Mr. BENNETT:

Q. That is what you base your statement upon, as to what the state of the art showed—your recollection of this Lyman apparatus?

A. Partly.

Q. Does it make any difference, as matter of fact, what the size of the compartment is which is to be cooled—as to the number of openings necessary to cause an equable distribution?

A. It does.

Q. Suppose that you had (taking your own illustration) a long

car of the shape of a lead pencil; suppose that we say that it is 160 feet long by 27 feet wide, and assuming it to be a closed compartment, and suppose that you place in that an apparatus consisting of ice-box and fan and an inlet at one end of the room and an outlet at the other end of the room, would that cause an equable distribution of air?

A. I should say, according to your question, that it would not.

Q. Have you ever tried it?

A. I have not tried it; no.

Q. Have you ever tried to ascertain whether or not if such an apparatus as I have described, having an inlet and an
59 outlet at opposite ends opposite to each other in an ordinary sized freight car—whether that apparatus would cause an equable distribution of air?

A. I have not. Mr. Lyman tried that, and failed in it.

Q. I am not asking for what Lyman did.

A. I am only telling you why I never tried it.

Q. Do you know, as matter of fact, that Lyman did fail?

A. I understood that he did.

Q. Did you know, as matter of fact, that he had failed?

A. No; I was not with Lyman.

Q. Suppose that I had an apparatus which consisted of a fan and an ice-box and three openings for permitting the air to enter into the room, and suppose that I had one opening for taking the warm air into the car, so as to bring it again in contact with the ice, would that bring it within the fifth claim of the Kelly patent?

A. Make me a drawing of the machine and I will tell you.

Q. How many openings are necessary to bring the apparatus within the Kelley patent?

A. Enough to keep all of the air in the room in movement.

Q. How many would be enough?

A. I do not know until I see the room and have the situation and know the shape of the room, the partitions in the room, and everything else.

Q. Then the size and shape of the room has a great deal to do with it?

A. It has a great deal to do with it; it has something to do with it anyhow.

Q. It has something to do with it; you are certain about that?

60 A. Yes.

Q. Suppose that you had a long, narrow room, how many openings would that require in order to secure an equable distribution of the air?

A. Make me a picture of the room and I will try to tell you.

Q. Suppose that I had a room 30 feet long and ten feet wide?

A. And unlimited in height?

Q. We will say 15 feet in height. How many openings, in your opinion, would then be necessary to obtain an equable distribution of the air in that compartment—fifteen feet high, 30 feet long, and 10 feet wide—being an enclosed compartment?

A. I should put in 15 or 20. I might put in more; I might put in less; I cannot tell. I think that that would do it. I would probably put in more.

Q. Then less than 15 would not do it, in your opinion?

A. Less might.

Q. How many less?

A. I do not know. Nobody else can tell, either.

Q. Did you not testify, as matter of fact, in a case in which this patent was involved, that an apparatus which had one inlet and one outlet and a fan and an ice-box arranged within a closed compartment was an infringement of this patent?

A. I do not recollect. I may have done so, referring to some special shaped compartment.

Q. Assuming that compartment to have been 24 feet long
61 by 7 feet wide and 8 feet high, would such a construction and arrangement of apparatus secure an equable distribution of air within that compartment?

A. How many openings has it?

Q. I say one opening; one inlet and one outlet, being at opposite ends of the room.

A. I do not believe that it would.

Q. Then you have changed your mind, if you ever did so testify?

A. I may have testified as to some other claims. I cannot tell what I have testified until you show it to me.

Q. This Lyman apparatus that you have been talking about—how early did you know of that being in existence? What is its date in the state of the art?

A. I knew of it from the Lyman patent. That is dated somewhere in the 50's, I think.

Q. The Lyman apparatus, such as you have stated it to be, was used, as I understand, in an enclosed compartment?

A. It was used in a car. That is all that I remember.

Q. Was it so arranged, as you understand it, and upon which understanding you have based your statement as to what was the state of the art, that it would use the same air over and over?

A. I understood that the air was passed into the ice and out of the ice.

Q. That is, after the air had come in contact with the carcasses and been warmed it would be brought in contact with the ice,
62 passed through it, and then out again into the refrigerating chamber, and so continue that process?

A. I do not know as it is so described, but that is my recollection of my understanding of it.

Q. Suppose that you were to put the Lyman apparatus in a closed compartment, it would so operate, would it not?

A. As I recollect it, it would.

Q. Do you know of any other refrigerating or cooling apparatus which existed besides the Lyman, as showing the state of the art to which you have referred, prior to 1864?

A. I do not recollect of any more at the present time. I think there were some; I do not know, though.

Q. Have you not, in this case, had brought to your attention, and did you not at the time you made the statement as to what the state of the art showed refer to or have in mind other apparatus besides the Lyman?

A. I remember seeing other apparatus, but I have not looked them up for years.

Mr. CONKLING: The question is whether, in making the statement of the art which you did, you did not refer to apparatus other than Lyman's.

Mr. BENNETT: You may answer that question—whether or not, in making your statement referring to the state of the art, you included anything other than the Lyman apparatus, the construction of which you described.

A. I included the general knowledge that I had. I did not include any other patent which I could name now.

Q. In making that statement did you include the Valance apparatus?

63 A. I included it, inasmuch as I knew about it.

Q. That affected your mind somewhat?

A. I knew of the existence of the patent.

Q. Tell us, as you now understand it, what the Valance patent did consist of?

A. I have not seen the Valance patent in four years.

Q. Prior to Kelley's invention did not the state of the art show, and did you not take that fact into consideration, making your statement as to what the state of the art did show, that there existed an apparatus for causing a forced circulation of air within a compartment, which consisted of an ice-box and a fan or other means for forcing the cool air through the apparatus, and a series of distributing pipes, without reference to the manner in which it was used?

A. I do not recollect such an apparatus.

Q. Suppose an apparatus was constructed consisting of an ice-box and fan and a number of conduits such as you think would be necessary to cause an equable distribution of air, and that it was used, not in a closed compartment, but in the outer air, would that be, in your understanding, within the fifth claim of the patent?

A. What you mean is, if I understand your question, if I should put Kelley's apparatus on top of a mountain and use it, would that be an infringement?

Q. Answer that. That will answer the purpose perhaps.

A. I do not know whether it could be legally held an infringement or not; but it would not be an infringement, in my judgment.

64 Q. It would be Kelley's apparatus in its mechanical construction?

A. It would be Kelley's apparatus; but it would be like trying to warm a ten-acre lot with a parlor stove.

Q. Tell us why it would not be Kelley's apparatus as covered by the fifth claim.

65 A. It would be Kelley's apparatus; but it would be using it in a useless way and without the necessary and usual ad-

junct that that apparatus must always have, to wit, the enclosing space within which the article to be cooled must be hung; but, as a matter of law, I do not know anything about it.

Q. Must that apparatus of necessity be an enclosed apparatus—entirely enclosed from the external air?

A. It must be an apparatus which will keep the air in so that it will circulate around the carcasses and then go back again to the ice.

Q. Then your understanding of this apparatus is that it is to be used only in an enclosed compartment and so as to circulate the air over and over again?

A. That is my understanding of it. My understanding is that Kelley does not mean to take outside air, cool it, and blow it onto something, and then let it go off into the atmosphere without doing any further good. There is not enough ice in creation to cool anything in that way.

Q. Have you never heard of compartments being cooled without reference to their being closed to the external air, so as to permit the same air to be used over and over again?

A. There may have been; I do not know.

66 Q. You have no knowledge of any such apparatus being used for such purposes?

A. I have heard that they cooled rooms by hanging wet sheets in the room to cool the air; but I would like to see you try to cool beef in that way.

Q. Kelly's apparatus would be operative, would it not, if it was placed in an apartment or hall to reduce the temperature and permit the air to flow out after it performed its office without retaining it, bringing it again to the fan and using it over again?

A. I do not understand what you mean.

Q. Would not the Kelley apparatus be operative for the purpose of cooling a compartment without returning the same air over and over?

A. I suppose it would cool some air in that way. There is no reason why it would not. There is no use in doing it so.

Q. But it would be, for that purpose, a cooling apparatus?

A. Yes; you could cool the air. You could cool the air out of doors with it; but if you were to put the ice out of doors it would cool the air just as well. There would be no need of getting Kelley's apparatus to cool it with.

Q. Suppose that I had Kelley's apparatus located in the hall and had a system of pipes which were run into this room for the purpose of reducing the temperature of this room in warm weather, would not that be an operative apparatus for that purpose?

A. I suppose that it would reduce the temperature of the room somewhat; but you had better put the ice in here and be done with it.

67 Q. But would it not be Kelley's apparatus as used for that purpose?

A. You might use it in such way.

Q. Would it not reduce the temperature of the room?

A. I suppose it would. It would throw the cool air into the room, but it would be a good deal like using your watch to throw at a cat.

Q. What language do you find in the fifth claim of this patent which warrants you, in your opinion, in saying that the use of this apparatus is to be confined to an enclosed apartment?

Mr. DICKERSON, Jr.: That is objected to, for the reason that he has made no such statement.

Mr. BENNETT: He has said that this was to be used in an enclosed apartment. I asked him whether he finds anything in that claim which warrants him in saying that.

Mr. DICKERSON, Jr.: If you ask the question in that way I will not object to it.

Q. Do you find in the language of the fifth claim of the Kelley reissue anything which warrants you in saying that this apparatus is to be used only in an enclosed apartment? And, if so, read the words.

A. I read, "as and for the purposes shown and represented." I turn to the specification and I find that that tells me to use it, among other places, in the hold of a ship, and that is where the defendant uses it, and that is a closed apartment.

68 Q. Are those the only words that you rely upon in that claim?

A. I suppose so. It is an apparatus for cooling carcasses, and they are usually hung in an enclosed chamber.

Q. Then there is nothing in the claim, aside from the words "as and for the purposes shown and represented," that would warrant you in saying that that apparatus was to be used only in an enclosed apartment?

A. Your question practically amounts to whether I find the words "enclosed apartment" in the claim. No; I do not.

Q. I ask you whether there is any other language of that claim, aside from the other parts of the specification of the patent, which would enable you to say that that apparatus is to be used only in an enclosed apartment.

Mr. DICKERSON, Jr.: That is objected to as immaterial and incompetent.

Mr. DICKERSON, Sr.: It is an attempt to get the witness to construe the patent. They have taken a great deal of time in asking him to state what is in the patent and what is not, and he has also told us about the state of the art and all about the use of the machine, where it is useful and where it is not, and now they ask him to indicate the words of the fifth claim which will cover this thing.

Mr. BENNETT: I want to know from this witness whether there is anything in that claim, aside from those words, which, referring back to the specification, would enable him to say that it is to be so used.

The COURT: He has said that he does not find the words "enclosed apartment" in the claim. He has also said that the

69 reading of the specification and the claim together indicates, as he thinks, that the apparatus is to be used in an enclosed room.

Mr. CONKLING: The question is whether we can analyze that statement and find what it rests upon.

70 The COURT: It seems to me that Mr. Bennett has pursued this thing to a point, so that it is perfectly clear what the witness means, and there cannot be any mistake about it.

Q. You have referred to the specification as containing something that warrants you in making the statement that it is to — used only within an enclosed apartment. Just quote all of that portion of the specification upon which you base your statement.

A. It would be necessary to quote the whole specification to do that. There is no use in doing that. The specification states that it is to be used in slaughtering establishments, where the meat is kept and where it is cooled. Those are always closed. Railroad cars, when used for refrigerating purposes, *they* are always closed. Grain bins are usually closed, whether cooled or not. Holds of vessels are closed.

Q. Then you base it mainly upon the fact that it says in the patent that it is to be used for cooling carcasses when hung to cool in slaughtering establishments, cooling halls, railroad cars, grain bins, the holds of vessels, and other places, and apartments in which it may be desired to reduce the temperature of the atmosphere?

A. I base it on that; I base it on common sense and the ordinary knowledge that the people possess. I fail to see that I need go further than the patent says—the holds of vessels—and here it is used in the holds of vessels.

71 Q. Have you never heard of the holds of vessels being other than air-tight?

A. They are open at times, but when a ship is at sea the hold is shut. If you want to go to the other side it is shut.

Q. Have you ever heard of its being desirable to reduce the temperature of the atmosphere of a room that was not air-tight?

A. Yes, sir; often.

Q. Then how is that you say that when the statement contained in the patent says that it is to be used for reducing the temperature of halls, and so forth, that it is only to be used in closed apartments, which exclude the outside air?

A. Because if you wanted to cool a room you would not use an apparatus like Kelley's. Common sense tells that.

Q. Does it not say in the patent that it is a cooling and air-distributing apparatus?

A. Of course it does; to be used to cool certain things, to wit, the hold of a ship, grain bins, &c.

Q. Do you understand that the hold of a ship is air-tight or excludes the outside air?

A. It is usually air-tight enough for that. Of course, a ship may have her hatches off; then she would be open; but it is to be used so that the air can circulate around in the same room.

Q. What experience have you had which enables you to make the statement that the holds of a vessel are usually air-tight?

A. I have not made that statement.

Q. Or usually have the hatches down?

72 A. I made the statement based on seeing a large number of steamers leave New York with the hatches down.

Q. You understand when steamers leave New York the greater part of them have their hatches down, so that the hold of the vessel is practically air-tight?

A. So far as the hold is concerned, they are usually shut up. The cabins are not shut up. The air don't dig in under the bottom of a ship.

Q. You take into consideration, do you, the fact that this patent says that it is an air cooling and distributing apparatus for cooling carcasses where hung to cool in slaughtering establishments?

A. I have noticed those words; yes, sir.

Q. Have you never seen a slaughter-house that was not air-tight?

A. I have seen the place where they kill the animals that was not air-tight. Where they put the animals to cool they are air-tight.

Q. Where it is in a slaughter-house—how is that arranged?

A. It is usually a brick building, with four walls and a roof, windows, and doors.

Q. In the summer time are those doors and windows usually closed?

A. They are open sometimes; sometimes they are closed.

Q. Have you ever visited a slaughter-house and witnessed the operations of slaughtering cattle so as to see the treatment re-

73 ceived immediately after being removed to the refrigerating apartments?

A. I have, very often.

Q. In slaughter-houses, where you say the doors, windows, &c., are open, haven't you noticed that the carcasses are permitted to remain there a certain length of time to permit the animal heat to go off?

A. They are.

Q. Would not the Kelley apparatus be of some value under such circumstances?

A. I should not think it would do the thing; the air is doing the thing; why import ice to do it?

Q. Would not the ice reduce the temperature?

A. It will; the air would.

Q. If the temperature were reduced would not that drive off the animal heat just so much quicker?

A. Yes, sir; no object in doing it.

Q. I am not speaking of the object. Therefore by the use of the Kelley apparatus in slaughtering-houses for a cooling apparatus it would be operative to reduce the temperature?

A. No; it would not be of use there; it would not cool the carcasses.

—. Does not Kelly say it would?

A. It would if you put it in a closed chamber; it would not if you hung it out doors with the wind blowing against it.

Q. Does Kelly say you should put it in a closed apartment?

A. Practically, I understand.

Q. Do you find the words "closed apartment?"

A. I don't find those terms.

74 Q. Do I understand you to say that if this Kelly apparatus was placed in a slaughtering establishment which did not exclude the outside air and the system of pipes arranged just as Kelly does it that it would not be an operative, practical apparatus?

A. I don't think it would be a practical apparatus; no.

Q. Why not?

A. Because there would be draughts, and the cool air would be blown about in every direction and the amount of ice you wasted would not be of any use at all.

Q. Suppose you had an apparatus such as shown in Kelley's patent; suppose you had the system of pipes arranged precisely as Kelly describes and you had a large fan, say a fan six feet in diameter, and you were to hang the carcasses in the open slaughter-house directly under each opening or perforation on the under side of the small pipes *t t*, don't you suppose that would be beneficial?

A. I never heard of it being tried. No; I don't think it would be beneficial.

Q. Would not that force a jet of cold air in direct contact with the surface of the meat?

A. It would come in contact with the surface of the leg of the meat. Whether it would get down to the body of the meat or not I don't know.

Q. Have you ever seen a current sufficiently strong in a slaughter-house to overcome the forcing in of a current of air from a perforation right down on the carcasses of meat when it was propelled by a fan six feet in diameter?

A. Yes, sir; the air would be carried off.

75 Q. Notwithstanding your opinion, does it not say in this patent that the tubes *t t t*, "smaller ones leading from it immediately over each row of carcasses, and in which S S S are slots or openings from which currents of air issue and descend or are driven upon each carcass or part of one, as may be desired?"

A. Yes, sir.

Q. Does it not state in the patent that such an arrangement as that is expressly contemplated?

A. Yes, sir.

Q. And in slaughter-houses?

A. Yes, sir; and in the apartments intended to cool the animals.

Q. Then, so far as any description is contained in this patent, confining yourself to the specification, if that apparatus was put in a slaughter-house, such as you have described, it would do just as Kelly says, wouldn't it?

A. I never saw a slaughter-house unless it had walls to it. If

that was put in a house with walls to it it would do just as Kelly said, and do very well.

Q. Wouldn't it do it if the doors and windows were open?

A. I don't believe it would do it to any useful degree.

Q. I am not asking whether it would be useful or not. It would operate that way just as he describes?

A. It would blow cold air through it, but it would not cool anything to any extent. It would be of about as much use as if you took a lady's fan and fanned the carcasses.

Q. You get some benefit from taking a fan and fanning in the open air, don't you?

A. Of course you do.

Q. Suppose you were to take the air to a fan and bring it in contact and force it over the ice, about what temperature
76 would the air leave the conduits?

A. That would depend very much on the ice-box and the fan and the speed of the fan and those details, and I cannot give you any definite statement of a certain temperature; that would be invariable in every case. It might vary some degrees in each case.

Q. What would be a fair average of the temperature at which it would leave the conduits?

A. I never held a thermometer to see; but let us say, for the sake of the argument, thirty-five.

Q. Then, if you operate this Kelly apparatus precisely as described there, so as to force a current of air down upon each carcass of meat, you would be forcing down upon each carcass of meat air at a temperature of 35?

A. If you did not have cross-currents of air to blow it away; if you were in a closed chamber you would; yes, sir.

Q. But by doing that you would drive off the animal heat to the extent of the reduction of temperature in the building, wouldn't you?

A. You drive off the animal heat by bringing the cold air in contact with the carcasses.

Q. Don't you know, as matter of fact, that it is the practice and has been the practice always to permit carcasses of meat to hang in open slaughter-houses for a certain limit of time in order to permit the animal heat to go off before putting it into closed apartments?

A. They let the animal heat dissipate itself in the atmosphere, which is usually cool enough to cool them down to a
77 certain extent.

Q. Does the Kelly patent describe or show any means whatever for distributing the air as it comes into the ice-box except through a series of perforations upon the underside of the pipes *t t*?

A. It described the holes in the pipes *t t*.

Q. Does it describe any other means?

A. It refers to slots and openings also as being used.

Q. Those slots or openings you understand to be the perforations on the under side of the small pipes *t t*, don't you?

A. Yes, sir.

Q. Then I would be right in saying that this patent does not

show or describe any means whatever for distributing the air except through a series of perforations on the under side of the small pipes *t t*?

A. That is the way the air gets out of the pipes. It could not get out if it did not have holes in it.

Q. Do you observe holes anywhere else except on the under side of those pipes?

A. No, sir; there are no holes shown on the top of the pipe.

Q. There are no holes in the ends of the pipes, are there?

A. There are holes at the ends; not in the ends.

Q. Therefore if the perforations upon the under side of these small pipes *t t* were removed you would have no means whatever for bringing the air either in contact with carcasses or in an apartment?

A. No; if you stuffed the pipe up tight you could not get a bit of air through it.

78 Q. Suppose you were to close those holes, and you were to open the ends of the pipes, and then you were to hang the carcasses underneath the pipes, and then put in an apartment where the doors and windows were open, you would not be able, would you, to bring the air in contact with those carcasses?

A. Probably it would blow away quicker than it would if the pipes were perforated on the under side, so as to force the current of air down. I don't think you would even then if the doors and windows were open.

Q. Does not Kelly describe that that is the way it is to operate?

A. Kelly does not. If the doors and windows are shut he does.

Q. Didn't you state that the patent did not describe or mention a "closed apartment?"

A. I say I think the terms of the patent refer to a closed apartment.

Q. Just refer to that language where the patent mentions an enclosed apartment.

A. The patent nowhere uses the term "closed apartment." It intimates "closed apartment," and the meaning of the language is that the apparatus is to be used in a closed apartment. That is the common-sense way of using it; that is the only way in which the apparatus can be made useful. If I am wrong and you are right, that is a question of the construction of the patent.

Q. You know, I suppose, that in steam vessels they have ventilators in order to create a draught and let the warm air out and also to take the cold air into the holds of vessels?

79 A. I don't think they do.

Q. They don't have ventilators or windsails in order to purify the air in the holds of a vessel?

A. In the fire-room, yes, where they want to get all the air they can. I don't think they ventilate down in the hold; some vessels may.

Q. Suppose we had this Kelly apparatus in the hold of a vessel and it should prove to be a fact that they did have ventilators or

windsails in order to let in the outside air, then, I understand you, this Kelly apparatus would not operate?

A. If you should substantially let out as much air as the Kelly apparatus took in I don't believe it would be of any use.

Q. Suppose the hatches were up.

A. If they let in as much air as the fan would draw and they took the new air and kept using new air all the time I don't believe it would be the Kelly apparatus.

Q. You don't think it would do any good, then, if you were in the steerage of a vessel and the temperature was, say, at about 90, to have the warm air taken out by the Kelly apparatus and cold air put in?

A. It would cool the room to an extent.

Q. It would do some little good, wouldn't it?

A. It might. Nobody would ever use such an apparatus for that purpose.

Q. Don't you know that in this country, as matter of fact, they have used for ventilating buildings, without reference to whether the apartment was closed or not closed, apparatuses consisting of an ice-box, fan, and distributing pipes?

80 A. They have used cold air around in rooms to lower the temperature; no doubt about that. I never saw such a thing used practically.

Q. The Kelly drawing does not show this apparatus inside of a closed apartment?

A. No; it does not.

Q. Does not the patent state that this air is to be introduced into an apartment; or, in other words, into any place or apartment to be cooled?

A. Yes; but I don't understand that that is fresh air that is to be introduced.

Q. You understand that that is cold air from the distributing pipes?

A. I do.

Q. What does the use of the word "into" in that connection convey to your mind?

A. Into the part of the apartment where the cold air issues.

Q. That is, from where it is to be introduced somewhere else?

A. To be moved around and kept in circulation.

Q. Or, it is to be moved, not to be introduced into, as I understand?

A. I don't say you understand. I know it is to be introduced from the pipes into the apartment; then go back inside of the apparatus; then be reintroduced into the apartment.

Q. Do you find described anywhere in this patent anything that is to be substituted or take the place of the ice-box in either of the forms shown or referred to in the fifth claim?

A. I do not find that the patent describes all the equivalents that might be used for the ice-chest; no.

Q. Doesn't it describe two forms of ice-box?

81 A. Yes, sir; two forms; one in Fig. 2 and one in Fig. 3.

Q. And the language of the claim is "the ice-chest or depository in either of said forms?"

A. Those are the terms of the claim.

Q. In either of those forms those two forms are shown?

A. They are, both of them. They might have shown fifty forms.

Q. Do the words "in an air cooler or apparatus for cooling carcasses," in the fifth claim, convey any impression to your mind as to how that apparatus is to be used?

A. It conveys the impression to my mind that it is to be used to cool carcasses.

Q. Does it in any way convey the manner in which it is to be used?

A. It conveys it inferentially. I know that if you want to cool carcasses the usual way is to put them in a room with the doors and windows shut and cool them in that.

Q. And it does not, to your mind, convey that this apparatus is to be used in an apartment so clearly as the words "as and for the purpose shown and represented?"

A. I think they both made an impression on my mind, but I don't know which is the most impressive.

Q. What do you understand by the use of those words, "in an air cooler or apparatus?"

A. I understand by those words a device for cooling carcasses or the like, and I know that that device is to consist, as I understand from the specification, of an air-propelling mechanism, an air-cooling mechanism, an air-distributing mechanism, and something to keep the air from being lost and drifting out and forming a part of the outside atmosphere.

82 Q. What language is there in the claim which conveys to your mind that this is to be an apparatus so that the air will not be lost?

Mr. DICKERSON, Jr.: I object to that question as having been sufficiently answered.

83 The COURT: What is the question?

The stenographer reads the question as follows:

"Q. What language is there in the claim which conveys to your mind that this is to be an apparatus so that the air will not be lost?"

The COURT: I think he has answered that by saying that there is no language in the claim, apart from the language of the specification, which signifies to his mind that there should be a closed apartment.

Q. Did you ever see an apparatus such as is shown and described in the Kelly patent in use?

A. Not identically.

Q. Did you ever see in use a refrigerating apparatus where there was a system of distributing, *t t t*, pipes constructed and ar-

84 ranged precisely as described by Mr. Kelly in his patent?

A. I never saw one identically like the Kelly drawings.

No.

Q. Is it anywhere stated in the patent that the air which is forced out through those openings in direct contact with the carcasses of meat is to be thereafter returned to the fan?

A. I do not find a definite statement in the patent that the air after it issues from the tubes is to go back to the ice-chest, or at least there is no such statement in terms.

Q. Do you find in any form in the patent a requirement that the air shall be used over and over? And, if so, read the words in which you find it.

A. I do not find in the specification, as I before said, any statement to the effect that the air is to be used over and over again.

Q. The same question as to claim five.

A. The same answer.

Q. How many tubes is it necessary that the apparatus should contain in order to be Kelly's apparatus and covered by the fifth claim?

A. I don't know; so long as there are enough to make an equable distribution of air throughout the room.

Q. Does he say so in the patent?

A. No; but that is the fact.

Q. You cannot tell us, then, how many of these small pipes it would be necessary to have to make it the Kelly apparatus?

A. If you have enough to make an equable distribution of air you have got the Kelly patent.

85 Q. Then if you had one and the room was small you would have the Kelly apparatus?

A. I don't know that you would.

Q. Why wouldn't you?

A. Because it would not enable you to get an equable distribution of air.

Q. If it did, wouldn't you have it then?

Mr. DICKERSON, Jr.: Are you referring to any particular case?

Mr. BENNETT: The case in question. The witness understands.

The WITNESS: I don't understand. You are referring to something that you have in your head and asking we whether that would contain the invention of the patent, and you don't tell me what is in your head.

Q. If you did produce an equable distribution of air, as stated in the preceding question, would that be the Kelly apparatus as you have stated it?

A. That is to say, with one pipe and one opening in the pipe?

Q. I say with one pipe.

A. No; it would not be the Kelly apparatus.

Q. Would two be the Kelly apparatus?

A. I don't know whether it would take two or six. I should think it would take more if you had an ordinary apartment to cool.

Q. But whenever you did by it produce an equable distribution, then would it not be the Kelly apparatus?

A. That, as I understand it, is assuming something that cannot be so.

Q. That you cannot obtain an equable distribution of air
86 in an enclosed apartment of any reasonable dimensions with one pipe?

A. I will illustrate: You cannot do it in that apparatus with one pipe. Now, what do you mean—a smaller apparatus than that or a bigger apparatus?

Q. Is there nothing within the limits of this specification which will enable you to say how many of these small pipes it is necessary to have in order to make it the Kelly?

A. No; it is not possible for me to say. I know you have got to have a larger number in any room or building.

Q. Now, suppose you had an apartment without reference to size.

A. You can't have that.

Q. Without reference to its exact size, in which you had placed an ice-box, a fan, and one of these small pipes, *t t*, constructed and arranged as in the Kelly apparatus, and you did secure an equable distribution of air, would it be the Kelly apparatus of the fifth claim?

A. I cannot suppose that, to begin with.

Q. Do you understand that the fifth claim is limited to a system of tubes, *t t t*, &c.?

A. I understand it is limited to tubes so that the air can escape from them leading to different parts of the apartment to distribute the air.

Q. Don't you understand that the limitation placed upon the language used there is, those pipes as constructed, arranged, and shown in the drawings and specifications?

A. Do you mean they must be round pipes, with holes or slots?

Q. I am simply asking you whether you understand that
87 those pipes T and *t t*, &c., are to be arranged and constructed as described in the specification and shown in the drawings.

A. When I ask you what do you mean you repeat the question without giving me any further understanding. If you mean to ask, Do I understand that the claim is limited to those particular, identical pipes shown in the picture and referred to by letter? then I will say no; the claim is not limited to those identical, round pipes with holes in the bottom.

Q. Does the specification describe any other construction of pipes?

A. It does not.

Q. Does the drawing show any other construction of pipes?

A. It does not.

Q. Then what authority have you, referring to the language of that patent, for saying that Kelly's apparatus included any other arrangement and construction of pipes except those with perforations upon the under side?

A. Because I have heard of two things being equivalents.

Q. I am not asking about equivalents. I am asking you what there is in that patent. What may or may not be equivalent is a matter we will consider hereafter.

A. That is just the matter you are asking me about.

Q. I want to know whether there is anything in that patent in the language used or shown in the drawings which enables you to say that the Kelly apparatus includes any other construction and arrangement of pipes except those marked *t t t* with perforations upon the under side.

88 A. The only way to answer that is this: To say that the Kelly patent describes no other method of circulating and conducting the air around the room—for emitting the air rather into the room—than the pipes *t t*.

Q. And does that specification state that there is a very important object to be accomplished by so arranging those perforations that a carcass shall be placed under each perforation?

A. The specification shows the best way of doing it, in my judgment.

Q. I am not asking about the best way of doing it. I am asking whether the drawing does not show that and the specification describe it?

A. Of course it does; and I say it is the best way of doing it.

Q. Does it, in your opinion, make any difference whether the cold air be let in from the top and the warm air from the bottom, or *vice versa?*

A. I should say the cold air ought to be let in at the top.

Q. Do you think it makes any difference in the sense of the Kelly patent whether the cold air is introduced from the top of the chamb r or from the bottom?

Mr. DICKERSON, Jr.: Now, your question is entirely incomprehensible. You say introduced from the top of the chamber.

Q. Introduced into the top of the chamber.

A. I should think it ought to be introduced at the top. As a question of law, I don't know what the effect is on the patent if some chamber had it introduced at the bottom.

89 Mr. CONKLING: What was the answer?

The WITNESS: I have said that, as far as the patent went, it showed it coming out of pipes that were arranged along the top of the apartment, but whether the patent would include one arranged differently I don't know.

Q. Would it make any difference in the operation of that apparatus and the question of whether you secured an equable
90 distribution of air in a closed apartment whether the air was introduced into the apartment at the top or bottom?

A. I think it would be better to introduce it at the top.

Q. Do you remember ever having expressed an opinion in reference to this patent upon that same question?

A. I may have. I have made a number of affidavits. I don't recollect the words of them all now.

Q. You have testified, as I remember, that you were familiar with the Toffey apparatus and testified in that case or had something to do with it. Am I correct in so assuming?

A. I remember hearing of the case called the Toffey case.

Q. Do you remember of having testified in regard to this same patent in the case of The Bate Refrigerating Company *vs.* Martin & Fuller Company, where you referred to the Toffey apparatus, which was held to be an infringement by Judge Nixon, forcing the air in at the bottom of the chamber in contradistinction to letting it in at the top?

A. I don't remember it. No; it may be as you state; I don't remember.

Q. It may be?

A. I say I may have testified as you state. The air could be forced in at the top and it could be at the bottom. Letting it flow from the ceiling is better than forcing it from the floor.

Q. I will ask you again whether it would make any difference in obtaining an equable distribution of air in a closed apartment by means of a Kelly apparatus, whether you introduced the air into the top of the apartment or at the bottom of the apartment?

91 A. I think it could be done both ways, but I think it would be better to do it in the way shown in the patent than in the way shown in the defendant's apparatus, where the air is introduced at the ceiling.

Mr. DICKERSON, Jr.: You are not referring to the defendant's apparatus in this case?

The WITNESS: This apparatus.

Mr. CONKLING: That is exactly what he refers to.

Q. Do you consider it a material difference whether you inject the air into the top or bottom of the apartment?

A. Material in the sense that the patent would not cover an apparatus in which the air went in at the bottom—material in what relation?

Q. Material in this relation—reading from your affidavit, which I now show you, in the case of The Bate Refrigerating Company *vs.* The Martin & Fuller Company (handing witness affidavit).

A. I fail to understand how this affidavit affects the matter. The conduit extends across the room and is provided with a number of perforations at different points on the ceiling.

Q. In the affidavit which I presented to you I find this statement, comparing with the apparatus of Toffey and the apparatus of Martin & Fuller, in the Toffey apparatus the cold air being introduced at the bottom of the chamber and in the Martin & Fuller apparatus the cold air being introduced at the top of the chamber: "The only differences between this apparatus and the one there shown

92 are (reading from affidavit). Do you still adhere to the opinion that it is immaterial whether the cold air be introduced into the top of the apartment or at the bottom of the apartment?

A. I think it is better to introduce the air at the top of the apartment. If you ask whether it is material in the sense of this patent, then I think it is immaterial; I think the patent would cover it either way; but that is an opinion I don't think it is for me to express, particularly here.

Q. Referring now to the defendant's apparatus represented by this model, on what occasion did you examine on shipboard?

A. I examined this on the occasion in 1881.

Q. Did you ever see it in operation?

A. I did not.

Q. Do you know, as a matter of fact, how the apparatus operates as it was used on board the Arizona at that time?

A. I think I know.

Q. What is your means of information as to its mode of operation?

A. I examined the apartment and I heard descriptions of how it operated from the people in charge. I found the date of the patent stamped upon the apparatus, and I read that patent.

Q. Then it is mainly from this patent that you obtained your information?

A. Partly from that patent; but mainly, no. Mainly from the box itself.

Q. Will you point out to the court upon that model what you consider to be the fan of the fifth claim of the Kelly patent?

A. I consider the fan to be the piston which moves the air, compresses it, and throws it out.

93 NEW YORK, *May 22d*, 1885.

HENRY L. BREVOORT recalled.

Cross-examination resumed:

By Mr. BENNETT: You stated, during the course of your direct examination, that apparatuses of this nature, referring to the Kelly apparatus, were used in enclosures. Will you state where you ever saw an apparatus of such a nature used?

A. I don't think I ever did.

Q. What knowledge have you as to the construction and operation of refrigerating apparatuses prior to 1864?

A. I have not any personally.

Q. Then, as a matter of fact, you do not know the way in which refrigerating apparatuses such as those, or apparatuses of any kind, were used prior to 1864?

A. I do not from personal knowledge.

Q. Nor have you any personal knowledge as to how slaughtering houses were constructed, have you, prior to 1864—that is, in reference to their being closed apartments or open to the external air?

A. Not from having been in them before 1864.

Q. Do you not find it clearly shown in the art that air-cooling apparatuses for the purpose of distributing cold air into apartments, halls, &c., had been used both in a closed apartment and in apartments not closed to the external air?

A. Cooling devices had been used, I suppose, or at least descriptions of devices for forcing air, which were used in buildings which were not closed.

94 Q. Isn't it possible for you to give me a direct answer to that question?

A. I have given, I think, a direct answer. There are descriptions of apparatuses that were used in open halls, and there are also apparatuses that were used in open halls, and there are also apparatuses that are used in——

Mr. CONKLING: The point is this: He asks you as to a specific kind of machinery. In your answer you used different terms which may mean other machinery. Therefore he wants you to answer the question as he puts it, about that particular description of apparatus.

The WITNESS: Just read the question again.

The stenographer reads the question.

Mr. CONKLING: That, you see, is the point; that kind of apparatus used for the purpose there specified. He asks you to answer as to that.

The WITNESS:

A. There are descriptions of such apparatuses.

Q. Used in closed and unclosed apartments alike, indiscriminately?

The WITNESS: Yes, sir.

Q. Then you have no personal knowledge which enables you to make the positive statement which you did make in your direct examination, that prior to 1864 it was the practice to use air cooling and distributing apparatuses in enclosed apartments only?

A. I don't think I made such a statement.

Q. You don't mean to make it now, anyway?

95 A. I certainly don't mean to make it now.

Q. You were asked on your direct examination, "In view of the state of the art as it existed at the time of the construction of Exhibit Kelly Patent, is it or not your opinion that such apparatus was to be used and that the intructions in the patent are sufficient to give to the user the idea that it must be used in an enclosed chamber?" Now, I desire you to state what it is in the state of the art, aside from the patent, that enabled you to make that statement.

A. The general knowledge that every refrigerator of itself is a closed vessel; the knowledge of the Lyman car; the knowledge of some other patents.

Q. But you said a moment ago that air distributing and cooling apparatuses had been used both in closed apartments and those that were not closed.

A. I said there were some descriptions, devices, that had been used to blow air into apartments, but they were not refrigerators in this sense, as I understand it.

Q. Does the Kelly patent mention the word "refrigerator" or speak anything about "refrigerator?"

A. I can read it over and see; I don't know. I know what it is to do; it is to cool meat.

Q. I wish you would refer to this patent and quote any part of it that describes or refers to refrigerators in contradistinction to air cooling and distributing apparatuses.

A. (After examining the patents:) The word "refrigerator" does not occur.

96 Q. You were asked yesterday what there was in the state of the art at and prior to 1864 in regard to the construction of refrigerating devices with reference to their being used in enclosures, to which you answered that "apparatuses of this nature were used in an enclosure." Now, I desire you to refer me to such uses in the state of the art prior to 1864 which you had in mind at the time of making that statement.

Mr. CONKLING: To any circumstances?

Mr. BENNETT: Yes.

A. I refer, first, to an ordinary house refrigerator. I refer, second, to the Lyman car. I refer to the Petler patent and other patents which I have seen, but which I cannot remember.

Q. Then you did not take into consideration at the time of making that statement that air cooling and distributing apparatuses had been used in apartments where the external air was not enclosed?

A. I had that in mind; yes. I had not forgotten the fact.

Q. Then, having that in mind, you ignored it entirely when you made the statement, as stated in your examination, that the state of the art showed that "apparatuses of this nature were to be used in enclosures?"

Mr. DICKERSON, Jr.: Won't you read the whole answer? You don't read it all. It is "apparatuses of this nature were used in an enclosure; apparatuses of the nature of that described in Kelly's patent were used in an enclosure."

Mr. BENNETT: I have quoted it.

A. I had in my mind and did not ignore the fact that cer-

97 tain apparatuses had been used that were not in enclosures.

Q. Then, confining it to the state of the art, it would be proper to say that air cooling and distributing apparatuses consisting of means for producing cold, means for forcing the air, and means for distributing cooled air had been used both in closed apartments and apartments that were not closed to the external air?

A. Stated as broadly as you put it, yes.

Q. Would it not be also correct to say that prior to 1864 the state of the art showed air cooling and distributing apparatuses consisting of an ice-box, fan, and conduits for cooling apartments, both closed and not closed to the external air?

A. If you mean by that statement the substance of the fifth claim I think not.

Q. I don't ask you anything about the fifth claim, and I should like you to answer the question as put.

The stenographer reads the last question.

A. I cannot answer the question either way in its present form. It is too broad to be answered yes or no.

Q. Would it be true in either form; and, if so, in which?

A. I can't answer that until I know more definitely what is intended to be asked.

Q. Let the question be repeated. You cannot put it any better.

The stenographer again reads the question.

A. Under some interpretations, yes; under other interpretations, no.

98 Q. I did not ask you in reference to any interpretation. I asked you whether it would be correct, as a matter of fact, to state that prior to 1864 it was shown in the state of the art that air cooling and distributing apparatuses consisting of an ice-box, fan, and conduits had been used to cool apartments, both closed and not closed?

Mr. CONKLING: That is the given device, if I may suggest. The device is given in the question.

A. Understanding the question as read, no.

Q. Just state how you understand the question.

A. I understand that you are attempting in words to describe the apparatus used in the fifth claim.

Q. You think that question of mine, then, describes the apparatus covered by the fifth claim of the Kelly patent, do you?

A. I personally don't, but I think that is what you intend it to mean.

Q. You needn't bother about what I am driving at at all. You answer the questions as I put them to you and as you understand them.

Question repeated as follows:

"I did not ask you in reference to any interpretations. I asked you whether it would be correct, as a matter of fact, to state that prior to 1864 it was shown in the state of the art that air cooling and distributing apparatus consisting of an ice-box, fan, and conduits had been used to cool apartments, both closed and not closed."

A. No.

Q. You say it would not be correct to so state?

99 A. As I understand your question. If you will make the question clear I will try to give you a better answer.

Q. Was it not old, as you understand the state of the art, prior to 1864 to use refrigerating apparatuses consisting of an ice-chest, a fan-blower, and one or more pipes or conduits for the purpose of cooling apartments that were closed and not closed to the external air?

Mr. CONKLING: Put in "those that were closed and also that were not closed."

Mr. BENNETT: All right.

The WITNESS: There was an ice-box, a fan——

Mr. BENNETT: One moment. I submit to your honor that we are entitled to know from this witness exactly what he understands the state of the art to show. He has made certain statements here in his examination. Now, the object of this is to separate his knowledge of the state of the art or what he knows of the state of the art,

as shown, upon which he bases it, and how much of it he bases upon the wording of the patent itself. It is a plain question. We do not need to have him go in and redescribe the apparatus or anything of that kind. I submit the court should instruct this witness to answer that question directly, without a long explanation and an attempt to avoid giving a direct answer.

The COURT: The explanation has got to come, whether it comes first or whether it comes second. It must come. The witness must be allowed to put upon paper exactly the statement which he means.

Mr. DICKERSON, Jr.: If, Mr. Bennett, you ask him what is
100 shown in the state of the art I am sure the witness will tell you all he knows. You won't allow him to do that, but insist upon putting words in the witness' mouth.

The COURT: I think you can get at it more quickly by allowing the witness to define exactly what he means and what he understands by the question, what construction he puts upon it, and what he intends to say in reference to that construction. I think he will take the orange apart about as quickly in that way.

Mr. DICKERSON, Sr.: The state of the art, the publication, can be shown in a moment, whatever it is. The general statements here don't prove anything to the court about the state of the art.

101 The COURT: Now, will you read the question?

The stenographer read the question as follows:

102 "Q. Was it not old, as you understand the state of the art, prior to 1864 to use refrigerating apparatuses consisting of an ice-chest, a fan-blower, and one or more pipes or conduits for the purpose of cooling apartments that were closed and also not closed to the external air?"

A. The difficulty I labor under is this: That question, as asked, would include, for example, that apparatus, perhaps, standing here. That question would include the Lyman car, perhaps. That question might include the thing described in some old patent. I don't know what it might not include. It might include a thing with one opening; it might include a thing with a hundred openings. No one can tell what mechanism the question covers. I can tell you what is old in the art, but I cannot give you a specific answer as to whether a certain thing is old or not old when it is described in such general terms that it might cover anything. That question asked covers every claim in the Kelly patent.

The COURT: Can you answer that question categorically, yes or no, and accompany your answer with an explanation of what you mean by yes or no?

The WITNESS: I can.

The COURT: Then we shall get at your answer to the question.

103 The COURT: Now you can answer. There is a question which has not yet been answered, the answer to which was interrupted by this discussion. Now, please answer that question categorically and accompany your answer with an explanation of

the understanding which you have of the question and which guides your answer, or an explanation of the reason why you give an answer yes or no, and then we shall bring this thing down to a point, I think.

The WITNESS: What question is there on record?

The stenographer read the last question.

A. It was old to use a fan, an ice-box, and one conduit in the Lyman car; it was old to use the devices shown in the Petler
104 patent. These devices were used in closed apartments. There is a description in an old patent to Vallence, but I cannot distinctly understand the machine, and therefore I will say nothing about it. It was not old to use a fan, an ice-box, and a system of tubes, as shown and referred to in the fifth claim of the Kelly patent, either in an open or closed apartment, as far as I know.

Q. Then, as I understand you, it is the system of tubes T *t t t* that constitutes the novel feature of the Kelly apparatus?

A. No; you don't understand me. It is the combination referred to in that claim, of which combination such tubes or the equivalent form an element or a part.

Q. Didn't you just say that an ice-box, fan, and conduits were old prior to 1864?

A. An ice-box is as old as the days of ice.

Q. I ask whether you did not say that the combination of an ice-box, fan, and conduit were old at the date of the Kelly patent?

A. I said that the Lyman car existed, which had an ice-box, one conduit, and a fan.

Q. Now, I want you to answer my question, whether the combination of an ice-box, a fan, and a conduit was not old at the date of the Kelly patent?

A. And a conduit?

Q. Yes.

A. Yes; that was old at the date of the Kelly patent.

Q. What is there, then, in this Kelly apparatus in addition to that?

A. There is a series of distributing pipes so arranged that you can distribute your cold air at a great many points in the
105 apartment instead of distributing it — one point.

Q. Just refer to the patent and tell me how those pipes are designated—that is, in addition to the old combination.

A. They are designated by the letters *t t t*, etc.

Q. Then it is not the only new thing that is added to the old combination in Kelly's apparatus, the system of pipes *t t t*?

A. Those are new. I have just said so. I say so all the time.

Q. Air cooling and distributing apparatuses being old for cooling apartments that were both closed and not closed to the external air, if you were given this Kelly apparatus prior to 1864 would not you have found just as much authority in the state of the art for using it in an apartment that was not closed to the external air as you would to have used it in an apartment that was so closed?

A. I think I should have found more authority to put it in a closed apartment than in an open apartment.

Q. More in the state of the art, as you understand it?

A. As I understand it; and I also must include my own understanding of the device that was offered me, to be used according to my own judgment.

Q. That is not the question; it is, If you were given this Kelly apparatus without any further information, your sole information being the state of the art, would you not have found just as much authority in the state of the art to have used that apparatus
106 in an apartment that was not closed to the external air as you would to have used it in one that was closed?

A. No; I cannot disassociate my own view of the thing from the state of the art.

Q. Am I correct in saying that the state of the art showing that cooling and distributing apparatuses had been used, both in enclosed apartments and those that were not closed to the external air—that your sole information for saying that this Kelly apparatus was to be used in closed apartments is confined to the limits of this patent?

A. I don't understand what you mean.

Question repeated.

A. I cannot make head or tail of that question. It may mean something, but it don't mean anything to me.

Q. We will see. We will probably make you understand it.

The WITNESS: I see it in another form.

Mr. BENNETT: You probably don't want to understand it.

Mr. DICKERSON, Sr.: You shall not insult the witness in my presence.

Mr. BENNETT: When the court reminds me of that fact it will be time enough.

Mr. DICKERSON, Sr.: No, sir; I will protect my own witness.

Mr. BENNETT: We will wait until the court says so.

The COURT: Let us go on.

Q. You having stated that it was old prior to 1864 to use air cooling and distributing apparatus for cooling apartments, both in enclosed apartments and those that were not closed, is your
107 sole information for saying that this Kelly apparatus is to be used only in a closed apartment confined to the knowledge derived from the patent itself?

A. You might use it in an open apartment if you wanted to.

Question repeated.

A. It is derived from what I see in the patent itself; it is derived from the state of the art; it is derived from my own common sense. Those are the three sources I go to for information.

Q. Let us drop the state of the art. We are now trying to divide the state of the art from this patent. Aside from the state of the art, and supposing yourself to be entirely ignorant of that, do you find anything in this patent that would warrant you in saying that this apparatus was to be used only within an enclosed apartment?

A. I think when I saw the patent and with ordinary common sense I would know enough to use it in an enclosed apartment. I don't know what condition I would be in if I had never heard of a refrigerator before. I can't imagine exactly.

Q. Would you find anything in this patent that would tell you to use it only in an enclosed apartment?

A. I would not find those terms in the patent, but I would find there directions all through to do it.

A. You having stated that you had no personal knowledge as to the construction of slaughtering-houses prior to 1864, I ask you, the language of the patent being "a new and useful improvement in air cooling and distributing apparatus for cooling carcasses where hung to cool in slaughtering establishments," is there anything in that statement that conveys to your mind that this is to be

108 used only as an enclosed slaughtering establishment where the outer air is entirely excluded?

A. From my knowledge of slaughtering-houses, yes.

Q. You told me you had no knowledge of slaughtering-houses prior to 1864—that is, in point of fact you did not know how they were constructed?

A. I said I had never seen slaughtering-houses. You ask me without any knowledge of a slaughtering-house.

Q. I ask you to take this patent itself and, considering the fact that it is an improvement in air cooling and distributing apparatuses for cooling carcasses where hung to cool in slaughtering establishments, whether from that you could say that this was to be used only in a slaughter-house where the external air was entirely excluded?

A. From those terms I could not say anything. Those few words, they don't describe anything. From the whole patent I could tell.

Q. The next statement is that this air cooling and distributing apparatus is to be used for cooling halls. Is there anything in that statement that would instruct you to use this only in halls in which the external air was excluded?

A. I could not take it paragraph by paragraph and say what it told.

Q. Won't you answer my question. Is there anything there?

A. No; not in those particular words, except that it mentions that the patent is to be used within a set of walls.

Q. Do you understand by the term "hall" that that means a confined apartment?

109 A. From the tenor of the patent, I do.

Q. I mean taking the word "hall?"

A. The word "hall" might describe an open or a shut thing, alone, standing by itself without the specification or drawing or anything else.

Q. You find in the state of the art apparatuses for cooling halls, do you not?

A. There are descriptions.

Q. And those halls are not closed halls, usually?

A. No; the old meeting-house in the Vallance patent seems to be open.

Q. And yet there is an air cooling and distributing apparatus for reducing the temperature of the hall?

A. There is an attempted description of one.

Q. Now, the next is air cooling and distributing apparatuses for cooling railroad cars.

A. I think that means closed. Those words, as I understand it, mean closed.

Q. Is not the ordinary railroad car not closed to the external air?

A. Railroad cars carrying passengers, yes. They don't ordinarily freeze passengers. The freight car or car in which refrigeration is to be carried on, or cooling is to be carried on, is invariably closed.

Q. Have you never heard of cooling railroad cars?

A. I never heard of cooling passenger cars in my life.

Q. Do you recollect the Berry patent, which was referred — by you in an affidavit in this case on a motion for preliminary injunction?

110 A. I don't remember it; I may have seen one.

Q. And you have no knowledge prior to 1864 of a ventilating or cooling apparatus?

A. That is another question.

Q. A cooling apparatus having been used for cooli[illegible]; the temperature of railroad passenger cars?

A. Yes; they have used air to flow through water to cool railroad cars.

Q. And they have had a system of tubes?

A. They have. The object was to get the cinders out. I don't remember it, but I believe it was.

Q. Don't you remember, in the state of the art, of passenger cars in which there were cooling and air-distributing apparatuses consisting of a fan, a means for cooling the air and pipes for distributing that air into passenger cars?

A. I do not.

Q. Then you would be surprised if that should turn out to be the fact, and that you had had it before you once before?

A. I don't know whether I would be surprised; I would simply think I had forgotten something I might have seen.

Q. Next is an air cooling and distributing apparatus to be used in grain bins. Is there anything in that use that would enable you to say that it was to be used only in grain bins that are closed to the external air and kept closed?

A. I think grain bins are usually closed; I don't know definitely, however.

Q. Don't you know, as a matter of fact, that if you take a
111 grain bin and put grain in there it will destroy that grain if you close it to the external air; that it will sour and commence to ferment?

A. I have not had much experience about grain bins.

Q. Suppose it should be a fact that in order to preserve grain it is necessary to have a thorough ventilation, then would the fact of

the grain bin in this connection convey to your mind that this apparatus was to be used only in an apartment where the external air was excluded?

A. I don't know; I don't know that that is a fact.

Q. Suppose it to be a fact?

A. I don't think it is a fact.

Mr. CONKLING: But that is no matter. He puts the hypothesis to you. He says, suppose it is true that grain will heat unless the outer air is allowed to come to it. Upon that hypothesis would you read those words in the patent as requiring that the bin should be hermetically or otherwise sealed from the outer air?

A. Yes, because here is an apparatus to keep it cool.

Q. Suppose that we have a grain bin and that it is filled with fresh grain, and that it is a fact that grain, if put in a closed apartment, will heat and spoil and it would be necessary to permit the cold air to come into that, would not this Kelly apparatus be of advantage in ventilating or refrigerating that grain bin, whether the external air be excluded or not?

A. It would be advantageous.

Q. Now, passing to the next use to which the patent states
112 this apparatus is applicable—that in holds of vessels—does that convey to your mind that it is to be used in the holds of vessels, where the external air is excluded?

Q. Where they are battened down and kept so?

A. It does.

Q. Referring to the defendant's apparatus, do you understand that this apparatus of the defendant is used in the hold of a vessel?

A. Yes; the one I saw was.

Q. It was in the hold of a vessel?

A. It was below the upper deck.

Q. It was below the upper deck?

A. It was down, I think, about sixteen feet from the main deck, as I recollect it now.

Q. Was it on the deck below the dining hall or above the dining hall, or was it on the same deck with the dining hall?

A. I don't remember. I didn't go in the dining hall.

Q. Then you really cannot say, as I understand it, that these defendants do use the apparatus in the holds of a vessel?

A. I can say this: I went down about forty or fifty steps to get into it. I don't know whether you call that below the deck or not. I do.

Q. Forty or fifty steps from where?

A. From the main deck. I am not talking of hurricane decks. I am talking of the main deck of the ship.

Q. When you examined this box you think it was in what we call the lower story of the vessel, or the hold of the vessel,
113 properly speaking?

A. I have told you the best I can tell about the position.

Q. You did not examine the vessel to see whether still below were apartments that were used for carrying grain to Europe?

A. I think there was a space below.

Q. Is not that space below what is technically termed the hold of a vessel?

A. No more than the space that this was put in. If this had not been put in there they would have put in other storage materials in there, I suppose. I don't know.

Q. Would there be what you would term two holds in the same vessel?

A. No; this was placed in the hold. There could not be two holds.

Q. Would you call the deck upon which the dining hall is located the hold of the vessel?

A. Partly.

Q. You would?

A. Yes, sir.

Q. Then everything is the hold, in your opinion, except the main deck?

A. No; it is not.

Q. I mean everything below?

A. The storage capacity below the main deck I would call the hold, but every portion of that is not used for storage nowadays. According to your definition, you would not say that the engine was in the hold of a ship. Where would you say the engine was located?

Q. Well, I am not under examination. Did you examine to find out on board of that vessel where this compression was
114 located?

A. I saw it.

Q. Was that in the hold of the vessel?

A. I will have to refer to the drawing.

Q. I would like you to refer to the drawing and answer whether that was in the hold of the vessel, as you understand?

Mr. CONKLING: What drawing—the drawing of the ship?

The WITNESS: The drawing of this apparatus.

Mr. CONKLING: You don't understand the question. He asked you where it was in the ship.

The WITNESS: I understand the question. I only want to see if the drawings show anything which I have forgotten (referring to the drawing). The air compressors are just above the chill-room—on top of the chill-room.

Q. In this connection state to the court whether the compressors was within the refrigerating apartments?

A. No; it was just on top of it.

Q. Then you did not find the defendant's apparatus, an ice-box or an equivalent, in the refrigerating apartment proper?

A. No; not inside; it was on top. The air-compressor portion was on top, and that was all that was on top.

Q. The air-compressing portion you say was in the apartment to be cooled?

A. I say the air-compressing portion was on top of the apartment to be cooled.

Q. Was entirely outside of it?
A. It was above it.
Q. Entirely outside of the apartment?
A. I don't know. I think it was entirely outside of it, but I am not absolutely certain as to my recollection of that.
115 Q. As you understand the Kelly patent and as it is described, the apparatus itself, consisting of a system of pipes, ice-box, and fan, is to be enclosed in the apartment to be cooled?
A. Not necessarily.
Q. Does it not say so in the patent, according to your understanding?
A. It says you may use in the ice-box an ice-house that will enclose it so as to make a covering above the ice.
Q. Then in your opinion it makes no difference whether the apparatus be located in the apartment or outside of the apartment?
A. I think you could locate the ice-box outside of the apartment if you had the proper conduits.
Q. Would it make any difference in your opinion whether it was so located or not?
A. As I view it now, no; it would not make any material difference.
Q. Then you would have the Kelly apparatus and be within your understanding of it if it was used outside of the apartment, except the system of distributing pipes being introduced inside and an opening in order to suck the air out?
A. You could make an arrangement like that, if it was properly done, that would come within the Kelly invention. Your description might not describe it in words.
Q. Now, returning to the uses to which Kelly says his apparatus is to be put in his patent, and especially in the holds of vessels—now, considering the hold of a vessel to be that part which
116 is below the decks and is used for storing grain, would you understand from the language here, and having that understanding of the hold of a vessel, that it was to be used only in the hold of a vessel when the external air was excluded?
A. I should understand that it was to be used in the hold of a vessel, and the hold of a vessel is usually shut. That is the very utmost that can be said on the subject.

By Mr. CONKLING:

Q. But would the fact of the hold being shut or open, the hatches up or down, at a particular time be the criterion by which you would decide whether they were using the Kelly apparatus or not?

Mr. DICKERSON, Jr.: I object to that. That is a question of law.
The COURT: I think not.
Mr. CONKLING: I am inclined to insist upon this question.
The COURT: I think that is a competent question.
Mr. DICKERSON, Jr.: Be good enough to note an exception.
Mr. CONKLING: Do you understand the question?

The WITNESS: I think I understand the question. It would not be the criterion.

Q. Then it would be true, would it not, whether the hatches were up or down, the hold open or shut—the fact of use would be, as far as you know, the same?

Mr. DICKERSON, Jr.: Same objection, ruling, and exception.

A. The use of the Kelly apparatus with the hatches open and the air flowing freely in and out would be a foolish use of the Kelly device and practically a useless use of it.

117 Mr. CONKLING: Question repeated.

Mr. DICKERSON, Jr.: I think the witness has answered the question.

The WITNESS: I have not got through yet.

Mr. CONKLING: It is not to get his opinion whether it would be wise or otherwise; it is simply for him to answer as to the fact.

The COURT: He is coming to it; he has not got through with his answer.

The WITNESS: I have not got through; I thought it was easier to stop.

Mr. CONKLING: I beg your pardon.

The WITNESS: As I understand it, and as I have repeatedly said, I think the Kelly apparatus, as shown in the drawing, or its equivalent, is intended to be used inside of a closed chamber. It could be used in the hold of a ship with the hatches open. It would still be that portion of the Kelly apparatus used without the addition of a closed chamber, which it ought to have to make it valuable, and the fact of the chamber being open would not take away the fact that the Kelly apparatus was inside of an open chamber. But as I understand it that apparatus is to be used in connection with a closed chamber—as a stove is to be used in connection with a room or a place to be heated.

Q. Does that conclude your answer?

A. That is all.

Mr. CONKLING: To save our rights, your honor, I move to strike out the whole of this answer, and repeat the question, which
118 is whether the hatches are up or down, as far as he knows, would the fact of a given use of a given apparatus be the same either way?

The COURT: He says yes.

Mr. CONKLING: He does in the course of this. He delivers a dissertation in the course of which he finally comes around to it. I move to strike out the answer, first, because I think this record ought to show, if we can make it, what the fact appears to be, and at the same time I ask to repeat the question and that the witness answer it, the whole question being—he has said that whether the hatch was up or down would not be the criterion. Then, whether it was up or down, would the use of this apparatus or its equivalent, as you understand it, be the same? Now, it would be or it

would not. It cannot be necessary to deliver a lecture about that and finally, in the course of it, incidentally remark that probably it would be so.

The COURT: I think the answer might as well stand. I think it is pretty plain what the witness intended to say.

Mr. CONKLING: Your honor does not strike it out?

The COURT: No.

Mr. CONKLING: Then we except to the ruling, and we ask to repeat the question and have an answer to the question, so that there shall not be any speculation hereafter what he did mean, and it is so easy to tell me that I want him to tell what he does mean.

The stenographer read the last question as follows:

"Q. Then it would be true, would it not, whether the hatches were up or down, the hold open or shut, the fact of use
119 would be, as far as you know, the same?"

A. As I understand the words "the fact or use" it would not be the same. It would be a different use of the thing with the hatches up and it would be a useless use of it.

Q. Won't you answer the question to satisfy yourself?

A. That is the best I can do with it.

Q. What is your answer?

A. It will be a different use.

Mr. CONKLING: I submit to your honor we are entitled to an answer to the question. It cannot be possible that when a witness is asked, would the fact—the fact, whatever it is—of use be the same—it cannot be possible that he misunderstands that.

Mr. DICKERSON, Jr.: The witness has answered it in terms.

The COURT: He has answered it that it would not.

Mr. CONKLING: By his former answer your honor said he virtually answered that it would.

The COURT: So I thought.

The WITNESS: I understand "the fact of use" a little differently.

Mr. CONKLING: What do you say?

The WITNESS: At first, when you first put the question to me, I did not have any doubt in my mind what you meant by "the fact of use." Now, since the discussion, I have a question in my mind what you meant by "the fact of use;" whether you understand it in the same way. What do you mean by "the fact of use?"

Mr. CONKLING: Will you allow me to explain?

The WITNESS: Certainly.

120 Mr. CONKLING: I mean if you had here on this floor a range—you know what that is, don't you?—or a cooking-stove, would it make any difference whether you went and opened that door or not, as the use of that range or that stove? Would not the fact of use be the same whether you opened that door or locked it?

The WITNESS: It would burn, I suppose, the same.

Mr. CONKLING: I am not talking about what the effect would be—whether it would be wise or profitable or otherwise. I only ask you

as to the fact of use of this device. Would not that be the same. The question is, Whether, at a given time, somebody had gone to the hatches or to a wind-sail on the top of the ventilator and had increased the suction or what not, wouldn't it be the same all the time with the same apparatus in the same place and the same thing doing it? That is the question.

The WITNESS: Now I shall answer it.

Mr. CONKLING: If you will. That is what we are waiting for.

The WITNESS: If that thing (indicating), Fig. 1 of the Kelly patent, was put on top of a mountain or in the hold of a vessel with the hatches off——

Mr. CONKLING: I object to this. He has stated all that once.

The COURT: I think he can answer yes or no. With the explanation given by the counsel you can answer yes or no.

The WITNESS: I will try to answer it that way. The
121 fact of use would be the same.

Mr. CONKLING: That seems to go without saying.

Mr. DICKERSON, Sr.: Ask him if two is two. It is just as plain.

Mr. CONKLING: How flagrant it must be to dodge it, then.

By Mr. BENNETT:

Q. It is further stated in the Kelly patent that this apparatus is to be used for cooling other places and apartments in which it may be desired to reduce the temperature of the atmosphere by the introduction of cool or cold air. Does the language there used indicate to your mind that this apparatus was only to be used in such other places and apartments where the external air was excluded?

A. It indicates that it is to be used within apartments, but the words themselves do not indicate whether the apartment is to be open or shut—those particular words.

Q. Then that statement of the use of the apparatus by itself would be as applicable to an apartment that was not closed as it would be to one that was closed, so far as it was used for the purpose of reducing temperature?

A. Those particular words taken by themselves, without the rest of the specification, would not indicate any fact in that regard.

Q. Don't you know that air cooling and distributing apparatuses have been used for cooling places and apartments where it was desired to reduce the temperature in this country where the apartments were not closed to the outside air?

A. I have heard that they have blown air through water
122 to cool rooms.

Q. Did you ever hear of an apparatus being used at the Capitol, at Washington, for changing the temperature there?

A. I think there is one. I have never seen it, though.

Q. Suppose you had an apparatus such as the Kelly apparatus and you used it in connection with this court-room that you desired to change the temperature of, what difference in degree would it make in the case where you were using this apparatus and in case you were not using this apparatus?

A. I don't understand what you mean by that.

Q. Supposing you were using this Kelly apparatus in this court-room for the purpose of reducing the heat of the room, what change would it make in the temperature of the room by the use of this Kelly apparatus?

A. I don't know. I know it would get lower. That is all I know. How much lower it would get I cannot tell.

Q. It is a common thing in this country and has been for many years to use air-distributing apparatuses for changing the temperature of public apartments, halls, and theatres, has it not?

A. I don't think it has. I never saw such a thing in my life used.

Q. You never heard of any air cooling or distributing apparatuses being used for reducing the temperature of apartments, public halls, etc.?

A. I did not say that. I said I never had seen one used. One has been used in Washington, I believe.

Q. Take hospitals, as an illustration. Has it not been a
123 common practice in this country to use air-cooling apparatuses for reducing the temperature in hospitals?

A. I never heard of it being done to any extent.

Q. Did you ever hear of it being done at all?

A. I have heard of hanging a wet sheet in the room to cool it?

Q. But you never have heard of the use of an apparatus consisting of a fan and means of reducing the temperature of the air and pipes for distributing it in the room or apartment to be cooled?

A. I don't remember hearing about that.

Q. I find it stated in the patent that the object of this apparatus is to reduce the temperature of the atmosphere by the introduction of cool or cold air. Do you understand the use of those words there to convey the same thing—cool and cold air—in your mind?

A. Substantially, as the air is to pass over the ice, and I understand it is to be what I should call cold air—as cold as ice will make it. That is what I understand it to be.

Q. In order to change the atmosphere of the apartment into which it is introduced?

A. Into another part of which it is introduced from the ice-box.

Q. Have you noticed the fact that the wording of this patent is "by the introduction of cold or cool air?"

A. Often.

Q. What does that convey to your mind—the use of the words "by the introduction?"

—. By introducing the cold air into the compartment from
124 the cooling apparatus—from the ice-box—through the fan-blower, or *vice versa*, and out through the pipes into the apartment.

Q. By the word "introduced" you understand it is to be introduced into the apartment?

A. I don't understand it is to be taken from the outside and brought in and introduced in that sense, and with a like equivalent is to go out.

Q. After you have introduced that air into the compartment to be cooled, whether it be from the outside or from an apparatus located in the room itself, is there any description following that as to what becomes of it afterwards—that air that has been introduced?

A. It does its work of cooling whatever is put in its path.

Q. After it has done its work is there any statement following in the patent telling you what use is to be made of that air?

A. There is no statement in terms as to what becomes of the air.

Q. I want to know whether by "introduction of cool or cold air" he understands it to mean introducing air which is not cool or cold with a view of chilling it afterwards.

The WITNESS: I understand that the air, after having performed its cooling effect, is itself heated. This air is then to pass into the ice-box, through it, driven by the fan, and is to be introduced into the portion of the apartment where the pipes may be located, introduced into the apartment from those pipes through the ap-
125 paratus, and again perform its work of cooling some substance to be cooled.

—. You miss the point of my question. I made the suggestion to my associate, thinking that he would put it.

Q. I read you these words, "To reduce the temperature of the atmosphere by the introduction of cool or cold air," and I ask you whether, as you understand it, that does not mean introducing cool or cold air—that is to say, air cool or cold when introduced?

A. Yes.

Q. It does not mean introducing air not cool or cold with a view of afterwards chilling it—which is to say, chilling it after it is introduced? It does not mean that, does it?

A. Not as I understand it.

Q. If this apparatus were to be used for introducing cool or cold air into a place or apartment to reduce the temperature without refence to what use is to be made of that air or what is to become of it after its introduction into the apartment, would not the requirements and every requirement of the statement of invention in this patent be satisfied?

A. The statement in terms would be satisfied.

Q. Would not every statement be satisfied that you find in this patent telling you how to use this apparatus?

A. I think I have said perhaps fifty times yesterday and to-day that there is no statement in terms of a closed chamber in that patent.

126 Q. But, if you will pardon me, that is not the point of this question. I will put it again.

Q. Then I understand you that the requirements of this patent would be fully and completely satisfied, so far as anything herein stated, when the cold or cool air has been introduced into the apartment?

A. I have said, and say it again, the terms of the patent would be not; the English language of the patent would be found there.

Q. You have referred to the equable distribution of air by means of this Kelly apparatus. That equable distribution, as I understand

you, is accomplished by a series of pipes, *t t t*, with perforations upon their under side?

A. No; it is accomplished by the entire apparatus The pipes with the perforations are one portion of the necessary apparatus for accomplishing that result.

Q. Does not the patent describe the use of these pipes with perforation on the under side to be the means and only means whereby this equable distribution can be accomplished?

A. It describes that those are the portion of the apparatus by which the air is to be delivered.

Q. Then in the sense of this patent you would obtain an equable introduction of cold or cool air into the apartment by forcing it through these perforations without reference to what after use is made of the air so introduced?

A. I would get an equable distribution of the air from the pipes. I would not get an equable distribution, however, if the apartment were open so that some of the cold air could go off in one
127 direction and some in another, some floating off through the windows, and some through the doors.

Q. Does not the patent state that the object is to properly equalize the air thus introduced or distributed?

A. You read me the quotation and I will tell you. Is that a quotation from the patent?

Q. Yes; you will find that right before the first claim.

A. The patent says, "to properly equalize the air thus introduced or distributed to the carcasses."

The stenographer reads the last question.

Q. What air does that refer to?

A. That refers to the air, as I understand it, that is in the apartment, that has been warmed by contact with the carcasses and which is to go back through the ice by the fan-blower and out through the pipe.

Q. Doesn't it state just the contrary—to properly equalize air thus introduced?

A. I don't think it does.

Q. That is, the air to be introduced—that that must equalized and not thrown in as one volume and in one place?

A. That is, is not the apparatus to take warm air from the outside of the apartment and throw it in the carcasses; is that what you ask?

Q. No, it is this: whether it does not mean to properly equalize the air introduced so that it shall be introduced at various parts of the room instead of in one volume and from one opening?

A. It undoubtedly means it is to be introduced from various openings, and that this will make an equable distribution of the air.

128 Q. The patent states, in speaking of this apparatus, that it is to "properly equalize the air thus introduced or distributed to the carcasses." Now explain what you understand those words to mean.

A. I understand that those words mean that the air is to be distributed as it is introduced into that portion of the apartment from the number of orifices, so that it may cool equally over a large area.

Q. Does not this patent state that the air introduced is to be equally distributed to the carcasses?

A. It says it is to "equalize the air thus introduced or distributed to the carcasses."

Q. That is what it means, isn't it?

A. Undoubtedly.

By Mr. BENNETT:

Q. Now, again let me ask you, that there may be no misunderstanding, whether you understand the language there "properly equalize" means "to properly equalize the air as it is introduced into the apartment" or has some other meaning?

A. I understand it to mean that the air as it comes from the ice-box and fan is to be distributed and equalized by passing out from a great number of perforations, which would not be accomplished where it passed out through one perforation.

Q. Will you describe to the court what it is in the defendant's apparatus which you say is the fan of the Kelly patent?

A. The piston of the blowing engine which forces the air outward.

129 Q. Will you just point out those pistons (referring to the model before the court). This we will call the steam cylinder, these the compression cylinders, and this the expansion cylinder (indicating).

A. We will say this (indicating).

Q. These two compression cylinders are not the fan of the Kelly patent?

A. I have just said they were.

Q. Those are the ones?

A. Yes, sir.

Q. Now, will you explain to the court how they operate to force the air?

A. They take the air in through suitable valves and compress it and push it out through the conduit.

Q. And these are the pistons, then, that cause the air to be pushed out into the conduits and circulated around?

A. Yes, sir.

Q. That is what you would call, I suppose, an intermittent motion, is it not?

A. No; it is a continued motion, the two of them. Each one has a reciprocal motion. The delivery of air is practically continuous.

Q. And they are pulsatory in their movement?

A. Not to any visible extent to the eye.

Q. But, as a matter of fact, such is the case?

A. The pistons move backwards and forward.

Q. It is not continuous in the sense that the fan rotates continually?

A. One is a rotary motion and the other is a reciprocating motion.

Q. Do you understand that the warm air from the refrigerating apartment is taken into these compressing cylinders?

A. The warm air from the apartment passes around here (indicating) and goes into the compressing cylinder.

130 Q. What operation is performed in the compression cylinder?

A. The air is reduced in bulk.

Q. Is that the only change that takes place in the condition of the air?

A. The air is heated, of course, by being compressed.

Q. The first operation is to heat and compress the air?

A. Yes, sir.

Q. To what degree of temperature is it increased in its compressed condition?

A. I do not know. I never saw the machine going. I never tested that.

Q. You never investigated it?

A. I could not; the machine was not in operation.

Q. Have you ever read anything in books upon this subject?

A. Not much. I have read some.

Q. Then your knowledge of the mode of operation of compressed air apparatuses is very limited, as I understand?

A. Well, I don't know about that; no.

Q. Then just tell me the source of information you have, aside from this apparatus.

A. I have read Tyndall, and—I don't know—a number of scientific books on the subject.

Q. Have you read scientific books of a date prior to 1864 on this subject?

A. I don't know whether they date before 1864 or after.

Q. Then your knowledge of compressed air machinery and its mode of operation is limited to what has occurred since 1864?

A. I don't know that. I don't think it is.

Q. Do you think it would be improper for you to state that that is increased to a temperature of fully three to four hundred

131 degrees in a state of operation?

A. I should not think it went up as high as that; it may, though.

Q. Would it be reasonable to say 250?

A. Oh, yes.

Q. Then the first operation performed is that of increasing the temperature of the air which has been taken from the apartment to about 250 degrees or more?

A. Whatever the temperature is.

Q. The impurities that are taken up by the air in its passage through the apartment are still contained in the air in its compressed condition, are they not?

A. Yes, sir.

Q. In the Kelly form of apparatus the hot air, as I understand you, is brought in immediate and direct contact with the ice?

A. It is.

Q. The very first operation is to throw off the impurities and reduce the temperature, is it not?

A. No; not necessarily.

Q. What is the very first?

A. The air first may pass in to the ice directly or it may first go through the cooling in the pipes and then be brought to the ice.

Q. But just the minute it is taken from the room the process of reducing the temperature of the air commences?

A. Yes, sir.

Q. And to that extent the impurities are deposited and carried off and taken out of this air?

A. To a certain extent they are taken off as it passes over the ice.

132 Q. Then we have as a first distinction between the mode of operation of Kelly and the compressed-air apparatus this, that in the one the air is taken and heated up to an intense degree, while in the other it is reduced and the impurity taken off?

A. There is that distinction.

Q. In the Kelly apparatus that is the only treatment the air receives, is it not?

A. No.

Q. What other treatment does it receive?

A. It is cooled, it is propelled, and it is equally distributed.

Q. In the Kelly apparatus, after the air is cooled and the impurities taken out, which is the very first operation to which it is subjected after being taken from the compartment, what is the next treatment it receives, if any?

A. It is driven forward by the fan and forced out.

Q. It is then in a condition to go out into the compartment?

A. Yes, sir.

Q. In taking the air in its state of compression in this compressed-air apparatus is that in a condition to go out into the refrigerating compartment at that period?

A. No.

Q. Then we have there the first distinction?

A. If you call it a distinction.

Q. Don't you call it a very great distinction in cooling one and heating the other up to a temperature of about 250?

A. No; it is more a distinction in words than it is a distinction in fact, when you consider the whole apparatus.

Q. I am confining you to the point that we are now talking about that the court may understand this machine thoroughly. Now, what is the next treatment to which the air is subjected at

133 the time it leaves the compressing cylinder?

A. It is cooled.

Q. Just describe to the court how it is cooled.

A. The stream of air is passed through it and the heat is absorbed by the water, which is taken away.

Q. What is the temperature of that water which is introduced?

A. I don't know what the temperature is. I have no means of finding out. I suppose it is cold water.

Q. Is it not sea water that is made use of?

A. I don't know. I could not find that out.

Q. That you did not find out?

A. I could not find out.

Q. You do not know whether it was hot or cold water?

A. I know it was cold water from the information that I received on the ship. I have not crossed the ocean with this apparatus; therefore I cannot tell.

Q. Assuming it to be sea water pumped as the vessel is crossing the ocean, its temperature would vary quite considerably, wouldn't it—the water that is used in this tower?

A. It might.

Q. Before leaving the port of New York it would be, say, 65 or 70?

A. It might. I am not going to commit myself to the temperature, because I have not seen the apparatus going.

Q. What do you understand to be the temperature of sea water in mid-ocean?

A. Between 60 and 70 degrees.

Q. Then we have this compressed air in a state of compression and heat up to a temperature of about 300 passing into this
134 tower and being brought into contact with water of, say, about 70, and that is what you say cools this compressed air?

A. I say that takes out the heat that was in it.

Q. How much heat does that take out?

A. I cannot answer that question.

Q. The compressed air after leaving this tower would certainly be of a temperature to exceed 75, wouldn't it, if you were using sea water of a temperature of 70?

A. Of course.

Q. Could you tell me the temperature of the air as it was taken from the compartment and introduced into the compressing cylinder?

A. I cannot. As I said before, I did not go to sea with the apparatus.

Q. You have no means of knowing what the temperature would be?

A. I have no means of knowing those details.

Q. Do you suppose at the time the air is taken from the refrigerating compartment and introduced into this compressing cylinder that it is as high as 75?

A. From the compartment?

Q. Yes.

A. No; I should suppose it was not.

Q. Then, even after it has been brought in contact with this water, the temperature of the air as it leaves that is yet much higher

than at the time when that air was introduced into this compressed cylinder?

A. Probably.

Q. Don't you know that to be a fact?

A. I say that is probably a fact.

Q. You don't know, do you?

A. I did not have a thermometer on any parts of the apparatus. No, I could not answer that in that way.

135 Q. When you examined that apparatus on board the steamship you did not make any special examination as to the temperature, &c.?

A. I could not; it was standing still anyhow.

Q. I only want to find out the fact. Whenever air leaves that (indicating) it is not then in a condition, is it, to perform the office of refrigeration?

A. No; not yet.

Q. In the Kelly apparatus, after the air has been cooled, it then goes directly into the chamber, I believe you say, owing to the force of the fan?

A. It goes through the fan, then into the pipes, and then from the pipe into the chamber.

Q. These pistons in the compression cylinder only expel it from the cylinder and cause it——

A. Force it along on its journey.

Q. I understood you to say it is still in a state of compression when it leaves here (indicating)?

A. Yes, sir.

Q. Where does the compressed air go from the water tower? I ought to tell you that this has been broken (referring to the model). There is a pipe. There ought to be a pipe here showing how it comes from the compartment (indicating). Just explain to the court where the compressed air goes from the water tower?

A. It goes into that tower; it is expanded in there; it passes in here (indicating).

Q. It then goes to another tower, this opposite tower (indicating)?

A. Yes, sir.

Q. And there, you say, it is partly expanded?

A. Part of its moisture is deposited.

136 Q. Is not the object of that tower to separate from this compressed air the water that it may mechanically have taken up by reason of its coming in contact with the water in the opposite tower?

A. Yes; the object of that is primarily to get rid of the moisture in the air.

Q. Then the compressed air, when it leaves this scrubber, is in precisely the same condition as it was at the time it entered, except that the water that was mechanically mixed has been separated from it?

A. It is colder, because there has an expansion taken place.

Q. An expansion equal to the water removed, I suppose?

A. I don't know how much the expansion is.

Q. Have you any reason for believing it to be any greater than that due to the fact of the removal of the water?

A. I don't know. I suppose it is an expansion sufficient to reduce the moisture. How much more than that they give it I cannot state.

Q. Your knowledge of compressed-air apparatuses prior to 1864 would not enable you to tell that, would it?

A. I cannot even tell what portion of my knowledge I gained before 1864 and what portion afterwards.

Q. Supposing you to have gained all of your knowledge of recent date, I mean, from books, patents, or other publications that existed prior to 1864?

A. I cannot answer that question; it is impossible. I don't know what books I have read of a date earlier than 1864.

Q. Do you know of a compressed-air apparatus that existed prior to 1864 that contained the features of the compressed
137 cylinder in combination with the water tower and scrubbing tower as arranged and operated in the defendant's apparatus?

A. I cannot say that I know of any.

Q. Suppose, then, that we assume that you did not know of any such apparatus prior to 1864?

A. Assume that.

Q. Do you know of any such apparatus, even from late investigations, of that nature ever having existed prior to Bell-Coleman's apparatus?

A. I don't know of any apparatus practically identical with this ever having existed before, having exactly the same combination.

Q. The air being still in a state of compression as it leaves the scrub tower, will you explain to the court the next manipulation that it receives?

A. It then passes to the expansion cylinder and does its work.

Q. That is the way you understand this apparatus?

A. That is the way I understand it; yes.

Q. That is, that this air, as it goes from the scrubber to the expansion cylinder——

A. I say I understand it so. I can look at the patent, if there is any question about it.

Q. What manipulation does it receive when it arrives at the expansion cylinder—that is, at that point what is done with it?

A. I don't know what manipulation it receives other than being allowed to expand and push the expansion cylinder from one end to the other.

Q. At the time that it arrives at the expansion cylinder is
138 it not in substantially the same condition as when it left the water tower?

A. It is dried and it is colder, but how much colder I do not know.

Q. Considering the fact that you have stated that it would be probably 75 degrees when it left the water tower, and also that in the scrubbing tower it is only permitted to expand to the extent of

the water there removed, about what degree of temperature would you say that the compressed air was when it arrived at the expansion cylinder?

A. I cannot say with any definiteness; I don't know how much expansion there is. I have not any judgment in the matter, because I have no fact on which to found an opinion.

Q. You cannot tell anything about it?

A. No.

Q. You say the next office is to permit that to expand?

A. Yes, sir.

Q. Now, what does that, permitting it to expand, do; what does it accomplish?

A. The water attempts to come back to its original bulk and is colder thereby, and from there passes out to the pipes here (indicating).

Q. Is it your understanding that if this air at the time it arrives at the expansion cylinder was permitted to expand freely into open space that that would reduce the temperature of this air?

A. Yes, sir.

Q. To what extent?

A. I don't know; I cannot give you figures.

139 Q. Do you know of a compressed-air apparatus that existed prior to 1864 that was a successful apparatus, in which the air in its condensed condition as it arrived at the expansion cylinder, not being permitted to expand into space, would produce cold of a degree sufficient for a refrigerating compartment?

A. I do not.

Q. Then you have no knowledge, as I understand you, of a compressed-air apparatus that existed prior to 1864 that would produce the results produced by this machine?

A. I don't know of any apparatus that had the two scrub towers and the expansion cylinder and the double engine, and all that. I have seen patents away back in 1830, I think, most extensive air-cooling devices.

Q. That was for air cooling?

A. That was a device to allow air to expand and to do work as it expanded and send out large volumes of cold air.

Q. Can you refer me to any patent, publication, or anything of the kind that will show a compressed-air apparatus that would operate, as you say, simply by permitting the compressed air to expand into space without any resistance and reduce its temperature to a degree sufficient to refrigerate an apartment, say, to 32 degrees?

A. No, sir; I cannot point out such an apparatus.

Q. When the air is being introduced into the expansion cylinder it still retains a very increased degree of heat from what it contained when it was taken from the cooling apartment; is not that so?

A. I presume it does; I don't know how that is.

140 Q. Just describe to the court precisely how the air operates in that expansion cylinder.

A. I suppose it expands and shoves the piston ahead.

Q. That is, it is made to perform work, as you understand?

A. It is made to perform work, as I understand.

Q. That is, the air is introduced behind the piston and causes it to move?

A. That is the way I understand the apparatus.

Q. What importance, if any, do you give to the fact that that compressed air is made to perform work?

A. Scientifically, I do not precisely know what that does, and I don't know that anybody else does, either. There are a great many theories after that. There is no use in going into the theory now.

Q. From your information of compressed-air apparatuses would you be at all surprised if it should be shown to be a fact that that compressed air, unless it did perform work in expanding, would not have its temperature reduced to any appreciable degree?

A. I don't know how that is. It is a question I have often thought of and never settled in my own mind.

Q. Then we may say that you know but very little about this compressed-air apparatus except the fact that it is a means for producing cold?

A. I know how it works. I don't know the key of all the theories which have bothered scientific people in regard to those facts any more than anybody else does.

Q. You do know, however, the one fact that it is a means for producing cold?

A. I know that among other facts.

141 —. And because it is a means of producing cold you have stated that it was an equivalent of the Kelly patent?

A. I said it was an equivalent of the fan-blower in the ice-box of the Kelly patent.

Q. Then, in your opinion, as I understand this Kelly apparatus, any means of producing cold is the equivalent of an ice-box in the forms there shown?

A. Any means of cooling air so that it would do the work required to force the air out through the distributing pipes.

Mr. CONKLING: May I enquire whether that means mechanical or chemical?

The WITNESS: Yes; either.

(The stenographer reads the last question and the answer.)

Q. And this, too, without reference to the mode in which it is accomplished?

A. The air might be cooled and it is cooled in this apparatus. It might be cooled by some of the freezing methods. There are a number of well-known ways of cooling air.

Q. Returning again to our expansion cylinder, at the time, we will say, of the throw of the piston, that the piston has reached the opposite end and its throw has been accomplished, now, what becomes of that air that has been permitted to expand in the rear of it?

A. I presume it is exhausted and passes out.

Q. Exhausted by what means?

A. Opening the valve and letting it out.

Q. There is a valve there, you understand, to let it out?

A. I suppose so. There must be.

142 —. Is it not the fact that the return stroke of the piston is what expels it?

A. That, I suppose, shoves it out.

Q. Is there any other means of expelling it?

A. No; I suppose not; I don't know of any.

Q. It is that which expels the cold air and introduces it into the apartment?

A. It is not the means. The means consist of the previously compressed air which you passed from the cylinder of this engine.

Q. Suppose after the piston had reached the end of the cylinder it was stopped, would that expanded air go out?

A. If it was expanded just exactly to the atmospheric temperature it would not go out. If it was expanded so that it still had pressure it would go out.

Q. Confining yourself to the defendant's apparatus as used by them, or as you understand it, and the piston having reached the end of the cylinder and the compressed air now being in the cylinder, how would it go out if the engine stopped there?

A. It would not go.

Q. It would remain there? The air would stay there just the same as it would in the Kelly apparatus if you stopped the fan?

A. Practically.

Q. Don't you know that it is a well-known fact that natural causes would cause it to circulate?

A. I don't think it would circulate to any great degree.

Q. A difference in the gravity of the air?

A. There would be such a slight circulation that it would

143 not amount to anything.

Q. Were there not and are there not at the present time refrigerators that depend entirely upon the difference of the gravity in order to cause the circulation?

A. Almost every house refrigerator would.

Q. Therefore the Kelly apparatus, if the fan was dispensed with, having an inlet and an outlet into the apartment, the air would be caused to circulate, owing to the fact that the cold air being introduced goes to the bottom and causes the warmer air to be crowded into the openings in the ice-box?

A. I don't mean it would circulate through the ramification of the tubes.

Q. That is, it would not circulate through those little perforations on the under side?

A. I don't think it would circulate to such a great extent.

Q. Suppose we did not have those little perforations on the under side and we had a number of conduits with the ends open—with open mouths?

A. That would not make any difference.

Q. By natural causes it would not circulate?

A. Not when it had to go through such a great ramification. The

friction increases as you increase the ramification of the pipes, and the natural circulation would be retarded.

Q. It would be retarded in a degree?

A. In a degree; there would be some circulation.

Q. So that if you had but one pipe with a very large opening and then you had one large opening into the ice-box you
144 would then get a circulation?

A. If you made a house refrigerator you would have a house refrigerator. That is what it comes down to.

Q. Suppose you stopped the engine after the throw of the piston, would that expanded air go out of itself?

A. Not if it was expanded down to atmospheric pressure; no.

Q. Would it go out expanded down to the extent that it is introduced by the defendant into the refrigerating apartment?

A. I don't know to what condition they introduce it. If you stop the refrigerating apparatus in this machine there would be no circulation; we all know that.

Q. Now, we have another difference, as I understand you, that the Kelly apparatus would circulate the air after the fan stops, while in this apparatus there would be no circulation whatever after the stoppage of the piston.

A. In the defendant's apparatus there would be no circulation after the stoppage of the piston. In the Kelly apparatus there would be a practically useless circulation, I think.

Q. The fan in the Kelly apparatus is what causes the cold air to be forced out and circulate, I understand?

A. That is the circulating means.

Q. And that is also the means that draws the warm air into the ice and brings it in contact with it?

A. It forces it out on one side and draws it in on the other.

Q. Then you are still of the opinion that it is the pistons of the two compression cylinders that is equivalent to the fan of the Kelly patent?

145 A. Those are the pistons. Other things are called into play in the course of the air through the machine.

—. Having performed the work, you are not, I understand, able to say whether it is by reason of the performance of that work that the temperature is reduced?

A. The temperature is reduced because the air wants heat and takes it from wherever it can get it.

Q. Going into space, you think, is what causes the reduction of temperature?

A. I do not say that at all.

Q. Won't you explain to the court what it is that reduces the temperature of that compressed air?

A. As I understand the theory of the thing, if you want to go into that, whenever you take air and compress it you heat it. If you rob the air of the heat that is due to the compression and then allow the air to expand, I believe you get cold. What the necessity is of letting it do work I never could distinctly make out in my mind, but almost all those air apparatuses have that arrangement,

so I suppose it is necessary, but I never made experiments to determine why. The thing is stated differently in different books.

Q. When that compressed air reaches the expansion cylinder there is a certain amount of stored energy, isn't there?

A. You can call it by that name if you wish.

Q. What form does that stored energy take in the expansion cylinder?

A. I don't understand what you mean.

Q. What form? It must take some form, must it not?

146 A. It disappears in work.

Q. Suppose it did not disappear by reason of being compelled to do work, what would become of it?

A. The air would expand. It would force the air from the apartment from which it was introduced out away from itself, and would occupy a space in the apartment that had previously been occupied by other air.

Q. Would it be right to say that it would take the form of heat?

A. I don't know whether it would become heat or not. It will eventually become heat, but the mere act of expansion, the mere blowing it out after it had been robbed of heat—it would be cold, even if it did not do any work.

Q. To what extent?

A. I don't know. I have not made any experiments on that.

Q. Will you state to the court where that expanded air goes from the expansion cylinder?

A. As I understand the apparatus, it goes into the conduits and is distributed.

Q. At the time it leaves the expansion cylinder, whatever may be the causes, it has been reduced to the temperature at which it is to be introduced into the refrigerating apartment?

A. Yes.

Q. And there it goes, as I understand you, through a series of pipes?

A. Through a large pipe and small branch pipes.

Q. Will you point out to me, having stated about the fan and the ice-box, what you say in our apparatus is the system

147 of pipes T *t t*?

A. Here is large T (indicating), and here is *t t*, with one opening at the end of each.

Q. Do you find in the defendant's apparatus a system of pipes having a series of perforations upon their under sides?

A. No. I find that the pipes have only one exit opening, and that is at the end.

Q. Now, supposing in the defendant's apparatus you were to hang the carcasses directly under those pipes that you have termed *t t t* in the Kelly patent, would there be a current of air forced down in direct contact with each carcass of meat?

A. Not individually from the holes in each particular pipe; no.

Q. You mean there would be no jet on each one?

A. Yes.

A. Is it not true that the air, if it were thrown out with any con-

siderable force, would be thrown over and above the carcasses of meat instead of in direct contact with the meat?

A. There would be a tendency to do that.

Q. Is it not a fact that the cold air in the defendant's apparatus, as shown in the model before the court, is brought in contact with the meat owing to the fact that it is so much heavier than the contained air of the apartment that it falls immediately to the bottom of the apartment?

A. Yes. There is a natural circulation in the apartment, as there is in every apartment.

148 Q. Is it not also true that if the cold air was introduced into the defendant's apparatus in one volume through one opening that it would immediately fall to the bottom of the apartment and gently circulate throughout the entire space of the floor precisely as if water had been introduced?

A. More or less.

Q. Is it not, to state it broadly, a fact that the introduction of cold air into an apartment causes it to operate substantially the same as if you were to introduce a volume of water into an apartment?

A. Yes; but it must not be confounded in rapidity of action.

Q. When cold air is introduced into an apartment and drops to the bottom and spreads itself over the entire surface, does it not depend somewhat upon the force of the fan or other circulating medium as to whether it distributes itself equally throughout the apartment or is caused to be sucked in?

A. Each apparatus would have to be judged by itself in that regard, I should think.

Q. Supposing instead of having a large number of openings, which you see here in the defendant's apparatus, you were to have two openings, one at each side and nearer the end opposite the compressed-air apparatus, and you were to introduce the cold air only in that way, would it not immediately drop to the floor and spread itself throughout the entire apartment?

A. Eventually and gradually it would do that, but it would never spread to all parts of the apartment.

Q. That you are quite certain of?

149 A. I am certain of that; yes, sir.

Q. Have you ever tried an experiment to ascertain whether such would be the fact or not?

A. In one form I have—in a refrigerator case I was in.

Q. Suppose it should appear, during the course of this trial, to be a fact that the Bell-Coleman compressed-air apparatus is used in refrigerators where there are but two openings, one at each side and near the end opposite the compressing apparatus, and that there is but one inlet into the apparatus, and that that apparatus, so arranged and used, successfully preserved meat so as to arrive at the market in a marketable condition after a voyage of, say, twenty-four days, would you say that that arrangement caused an equable distribution of air throughout the apartment?

A. I should not say anything until I saw the apparatus. You have not given me the size or shape or anything.

Q. Leaving out of consideration the size of the apartment, or, in other words, assuming it to be an apartment which covers the entire hold of the vessel, if you please, and that into that refrigerating apartment and compressed-air apparatus there are but two inlets for the introduction of cold air, and that there is but one outlet for the escape of the warm air after it has performed the office of refrigeration, and that so arranged and used that apparatus has successfully transported meat for a period of twenty-four days and brought it to the market in a merchantable condition, would you say
150 then that there must have been an equable distribution of air throughout the entire apartment?

A. If the apartment was entirely full of meat, as an apartment ought to be, and all the meat in a marketable condition, and not simply that which was on the line of the air passage, I should be disposed to say that there was a good circulation.

Q. Then that would be a very severe test, I suppose, of what you would consider an equable distribution of air over this refrigerating apartment?

A. If it worked in practice.

Q. Would it not be, in your opinion, a very severe and conclusive test that every piece of meat hung in that apartment came out in an excellent condition and ready for the market?

A. And that the apartment was full?

Q. Yes; that the apartment was full.

A. That would be an evidence of circulation in there; yes.

Q. Now, suppose we supplement that construction and say that on top of that refrigerating apartment that we have just been talking about there was another refrigerating apartment of the same size, and that there were but two outlets from the lower refrigerator into the upper refrigerator, and that there was no way of getting any air into the upper refrigerator, except that which passes from the lower refrigerator, and that there was but one opening from this upper refrigerator into the compressing apparatus, and that so arranged, that apparatus had preserved meat for a period of twenty-eight days, the upper compartment being filled entirely with meat throughout every part of it and every part of that meat having been in
151 an excellent state of preservation, would not you say that that was an equable distribution in the true sense of the word?

A. I would not think so until I saw it.

Q. If it was true?

A. It would be an equable circulation if it was so.

Q. Then would not you be compelled to say that in the defendant's apparatus these pipes—the pipes which you have termed the equivalent of the small pipes in the Kelly apparatus—were immaterial?

—. No; I should not by any manner of means.

Q. Notwithstanding the fact that it — been demonstrated that without that system of pipes and without those branch pipes you could get precisely the same equable distribution of air, or at least such a distribution of air that it would preserve meat in every part of that room——

A. Because you have got an apparatus that has not got these pipes that is no reason for me to think that you could dispense with the pipes in the defendant's apparatus.

Q. I will put it to you so that there cannot be any misunderstanding. Suppose it should be a fact that this identical construction and arrangement of the defendant's apparatus, with the exception of the small branch pipes, and so that there were but two inlets, one at each side and nearer the end opposite the compressing apparatus, and but one outlet, had been used successfully for the transportation of meat for a number of days, the meat being hung in every part of the apparatus and every part of the meat being successfully
152 preserved, would you not then say that the small branch pipes were of no consequence in the defendant's apparatus?

A. I should say he had made some alteration somewhere else.

Q. Assuming that there was no other alteration; assuming it to be in every respect the same as the defendant's apparatus now before you, with the exception of the branch pipes?

A. With the compressors worked exactly the same?

Q. Precisely as in the defendant's.

A. No alteration?

Q. No alteration.

A. I should say, then, it would work with two openings, and the branch pipe would not be necessary if that was proved to me.

Q. I think that you have stated that you do not find in the defendant's apparatus either a fan or a series of pipes, such as the pipes *t t* in the Kelly apparatus, with perforations upon their under sides, and so as to force a current of air down in direct contact with each carcass of meat?

A. I have said that the identical structure was not in the defendant's apparatus.

Q. I believe you have also stated that, so far as your knowledge goes, this apparatus used by the defendants was not known prior to Kelly's patent?

A. Not the particular apparatus; at least, it was not known to me.

Q. So far as you know, it was not a known substitute for an ice-box?

A. Not that particular form of apparatus was not.

Q. Can you refer me to any compressed-air apparatus that
153 had the mode of operation of the defendant's apparatus that was a known substitute for an ice-box prior to 1864?

A. I have just told you I don't know of any apparatus with the scrubber and the washer and all that the defendant's apparatus has.

Q. Do you know of any compressed-air apparatus, whatever it was, that could be termed a successful apparatus for reducing the temperature to a degree sufficient to refrigerate meat in long voyages having been used prior to 1864 as a substitute for an ice-box?

A. There was one patented somewhere in 1830; I cannot remember the date now nor the name. It was a very full and copious description. I can look it up for you.

Q. Can you remember anything about it that would indicate what you refer to?

A. I can look it up.

Q. You cannot give it to us now?

A. No; I have not seen it in ten years, I think.

Q. Do you know of any instance where a compressed-air apparatus was used prior to 1864 for producing cold in combination with a series of pipes for distributing the cold air thus produced?

A. I cannot give you any reference without looking one up.

Q. You haven't any in your mind?

A. I haven't any specific reference in my mind. That sort of thing has been used; I can't tell where.

154 Q. On further consideration, don't you think you rather overstated it when you said on your direct examination that the method used in the defendant's apparatus was old and well known?

A. No; I don't think I overstated it. Everybody knew and has known for years that if you wanted to cool air you could cool it by ice or by chemical means.

Q. Do you bear in mind the words "the method used in the defendant's apparatus being old?"

A. There are no details of a scrubber and those parts in the apparatus. I want simply to say if you took the air and compressed it and reduced its temperature you are pleased to do it with the details you have got here, but it is not necessary that you should do it with those details.

Q. Stating it broadly, there were means known prior to the Kelly patent for producing cold?

A. No; you have stated it too broadly now.

Q. Prior to the Kelly patent there were means, apart from bringing it in contact with ice, of reducing the temperature of air?

A. There were, and those means consisted of air compressing and expanding devices.

By Mr. BENNETT:

Q. When you used the language "the methods used in the defendant's apparatus" in your direct examination you did not mean to be understood as conveying the idea that this method

155 of producing cold as used by the defendant was a known substitute for the Kelly ice-box?

A. I did not include the water towers and that particular form of apparatus, but the general form.

Q. Is not that part of the apparatus?

A. That is a detail that is adopted in the machine.

Q. How would it be if each and every step composing this method was employed to produce this result which the defendant does produce?

A. It is unnecessary for you to have a scrubber in that perticular form. You could compress the air and allow it to cool by other means.

Q. You think you could?

A. You can put the water outside of it.

Q. You must get the water out of it?

A. You have got to get the heat out of the air.

Q. Is not this what you really intended to convey in making that statement that you had heard of compressed-air machines for producing cold prior to 1864?

A. I had heard of a great many of them.

Q. And not that you knew of this method of producing cold employed by the defendant?

A. I don't suppose that anybody knew of this method of producing cold, except the inventor, before the date of the patent, in 1880—the particular method, the particular apparatus you have got.

156 Q. Suppose instead of ice we had a system of tubes, a coil of pipe, and through that coil of pipe the refrigerant material was circulated, and that you brought the air in contact with the cold surfaces of the pipes and then introduced it into the refrigerating chamber, would that be your understanding of an equivalent or substitute for the Kelly ice-box?

A. I will give an opinion when I see the apparatus.

Q. It is not very difficult, is it, to understand what a coil of pipes would be through which a refrigerant material was circulated; that you understand, don't you?

A. If you want me to state what I understand you to mean I will state it and give an answer.

Q. Don't you understand what I mean when I say employing a coil of pipe and through that coil of pipe circulating a refrigerant material?

A. I understand that to mean two things; it does, as a matter of fact.

Q. State what you understand it to mean.

A. That may mean a method that was adopted for transporting meat—I don't know how successfully—and it might mean that instead of using the Kelly ice-box it had a compressor and you took a small space in your apartment and made cold in there by some other means, and then passed the air over those pipes, and then passed it out through the opening here under the deck of the ship. Which of those two do you mean?

Q. Would that be the equivalent of Kelly's ice-box?

A. The last method referred to?

Q. Yes.

A. I should think it might be considered so.

157 —. Then, in your opinion, this patent of Kelly's would take in as the substitute or equivalent for an ice-box any means whatever for producing cold?

A. Known means—yes; that is a known means.

Q. Taking a coil of pipe and circulating it through?

A. That is a known means of producing cold.

Q. I think you stated that you did not know of any instance prior to 1864 in which a compressed-air apparatus had been used

for producing cold in combination with a system of pipes to distribute the air thus cooled?

A. I said I could not give you a reference, name, and date and number of one, but if you wanted one I would look it up for you.

Q. You do not know of any now, at present, you mean?

A. I cannot recall the date of a patent that I have seen five years ago.

Q. In the Kelly apparatus was not the air both purified, dried, and cooled in being passed over and in contact with the ice?

A. Yes.

Q. Then there is nothing new in the fact of drying and purifying air by bringing it in contact with ice, is there?

A. That is known.

Q. Would not the air in the Lyman apparatus as it left the ice-box be precisely the same in every respect as the air which leaves the ice-box of the Kelly apparatus at that point?

A. It might have been; I don't know how it was, as a matter of fact.

158 Q. Do you know any reason why such should not be the case?

A. No; I don't think I do.

Q. Then at the time the air leaves the ice-box in both the Kelly apparatus and the Lyman apparatus it is the same in every respect?

A. I don't mean to state that broadly. I simply say that if you take the Lyman apparatus and that method you might have made it the same. I don't know whether it ever was the same. There may be some inherent difficulty in the machine for making it the same. I don't know.

Q. In your opinion it would be the same?

A. I have not got any formed opinion on the subject.

Q. Is there any reason why it ought not to be?

A. That is a thing I can't answer now. I don't know about the Lyman car.

Q. In both cases the warm air would be brought in contact with ice?

A. Yes; the factors are there to make it the same in both cases, perhaps.

Q. And in both cases the air would be drawn in contact with ice through the ice apartment?

A. That is the intention, anyway.

Q. In both cases it was forced out, wasn't it?

A. That was the intention. They had a fan.

Q. And therefore you see no reason, if the apparatus were to be made in a workmanlike manner, why the kind and character

159 of the air as it leaves the ice-box in both should not be the same?

A. I don't see any now, as I sit here. I may see a very good one when I look up the Lyman car again.

Q. You do not see any now?

A. I do not now.

Q. If there was any reason would it not be merely owing to some defect in the structure?

A. I cannot sit here and guess at that for you. I will wait until I get facts. There was air and it was brought in contact with ice. That is all I can tell you about that.

Q. Would a chemical process, first adopted after the date of the Kelly patent for chilling or cooling air, employing neither an ice-box nor ice nor a fan nor a blower infringe the Kelly patent as you understand and have explained it?

Mr. DICKERSON, Jr.: I object to that. If this witness can be asked as to what is an infringement and can be further asked as to what is in the decisions in the Supreme Court and what is the meaning of the decisions as to known or unknown equivalents, I am very much surprised. There are two questions of law in that. In the first place, infringement in and of itself is a question of law. In the second place, the question of whether a thing invented subsequent to a patent is or is not an infringement is an additional question of law, about which probably none of us are very sure. I am sure I am not.

Mr. CONKLING: If your honor will permit me, this is my question that I asked my associate to put. I think it is competent.

160 The COURT: The objection to the question seems to me to be to the clause "first known after the date of the Kelly invention."

Mr. CONKLING: If it was before, of course it would antedate it. I merely put it there to have it fall within the life of the Kelly patent. It could not infringe if it was before, and it could not infringe if it was after.

The COURT: Then your question is whether the chemical arrangement for chilling meat which was first discovered or invented after the date of the Kelly patent——

Mr. CONKLING: If your honor will allow me to say "adopted during the lifetime of the Kelly patent."

The COURT: That implies that it was not known before.

Mr. DICKERSON, Sr.: It may have been known before, any may not.

Mr. CONKLING: It may and may not. I want to give them the benefit of it.

161 Mr. DICKERSON, Sr.: The objection, beyond that which was mentioned by the court, is a legal objection, namely, asking an expert witness whether such and such a thing is or might be an infringement of a patent. That is not a question that can be put to a mechanical expert.

162 The COURT: I don't think the question is admissible.

Mr. CONKLING: On what ground is it excluded? Because I want to put another question which will avoid it.

The COURT: The implication is that the chemical process was first discovered after the date of the Kelly invention, which I think involves a question of law, and therefore it is incompetent for the witness to answer. Then I think if you strike out an answer yes or

no will not contribute at all to an elucidation of the question whether this thing is an infringement of the Kelly patent.

163 Mr. CONKLING: I think I see your honor's idea. If you will note our exception we will beg to ask another question.

Q. You spoke in your examination of "known equivalents" for an ice-box, did you not—well-known equivalents?

A. I think I did speak of the air compressors as a well-known equivalent for an ice-box. I think I did.

Q. In referring to equivalents to the ice-box of Kelly did you or do you include any means, mechanical or chemical, of chilling air?

A. I know that there are other methods of chilling air.

Q. You have missed the point of my question. It simply is whether you did or whether you do include among your equivalents what the question describes.

A. For the purposes of answering the question I will include a chemical means—yes, if necessary.

Q. Did you or do you include any means whatever in chilling air, chemical or mechanical, even though they employ no ice-box, no ice, no fan, and no blower?

A. No; if I understand the question.

Q. Name any means of chilling air that you excluded when you spoke of known equivalents for the Kelly ice-box.

Mr. DICKERSON, Sr.: The ice-box by itself; not the combination.

Mr. CONKLING: If your honor please, I must object to this.

164 The COURT: Of course, it is not professional to instruct a witness on cross-examination.

Mr. CONKLING: I suppose not.

Q. Do you understand the question? I ask you to name any means of chilling air which you excluded from your answer about equivalents, if you did exclude any. That is very simple.

A. This has nothing to do with your previous question, then. The previous question referred to dispensing with a fan and dispensing with an ice-box.

Q. Oh, no; I asked you whether you stated on your direct examination—as I had it before me and you remembered it, and therefore I did not read it—that there were other well-known equivalents for the ice-box.

A. There are.

Q. You remembered that you had stated that. Then I asked whether you excluded any means of chilling air from that

165 reference to equivalents. I understood you to say in your last answer that you did. I then asked you and I now ask you to name to the court any means of chilling air which you did and do exclude from your statement that there were equivalents.

A. You misunderstood my last answer. That is where the trouble comes in.

Q. Then it is your right to correct me, and I beg you to do so. What did you intend to answer that you think I did not understand?

A. Just have the previous question read.

The stenographer read the question and answer referred to as follows:

"Q. Did you and do you include any means whatever in chilling air, chemical or mechanical, even though they employ no ice-box, no ice, no fan, and no blower?

"A. No, if I understand the question."

Q. Name any means of chilling air that you excluded when you spoke of known equivalents for the Kelly ice-box.

The WITNESS: You have broken up the combination.

Q. Is that answer right?

A. That is right.

Q. There is no misunderstanding about that?

A. There is no misunderstanding about that.

Q. Then do I understand you to say that there are means of producing chilled air which you do not include in speaking of the equivalents of the Kelly device?

A. I do not exclude chemical means, such as salt and ice.

Q. I do not ask you that. I ask you whether there is anything that you do exclude.

166 A. I don't know that there is; no; I don't think there is, as I understand your question.

Q. That we may understand each other surely, I will repeat it. Are there any means or is there any mode known to you of chilling air which you do not include as an equivalent of the Kelly process—combination?

A. No; the three methods that are known to me, I think, would all be equivalents for an ice-box.

Q. What are those three?

A. One is ice, one chemical, to wit, with salt and ice; the other mechanical, to wit, with an air compressor. I think either of those three methods could be used.

Q. I understand you to say that the only mode of chilling air that you are now aware of is either by ice, by salt and ice, or by compressing air?

A. And expanding it again.

Q. And you have intended to say and do say that those three modes are each the equivalent of the other?

A. I think that those three modes could be used interchangeably.

Q. Would any means of producing cold and a means of causing a forced circulation of the air so cooled be, in your opinion, the equivalent of the Kelly ice-box and fan?

A. I cannot answer whether any means would be or not. Show me the means and I will try to tell you whether, in my opinion, it would be or not. The expression is too indefinite.

167 Q. Would any means of producing cold that is now known to you and any means of causing a forced circulation of the air so cooled be, in your opinion, an equivalent of the Kelly ice-box and fan?

A. I have said that any of the three means that are known to me would be.

Redirect examination by Mr. DICKERSON, Jr.:

Q. You were asked something about the Lyman patent. Had you at that time looked up the date of the Lyman patent or the patent for the Lyman car to which you have referred?

A. No; I had not.

Q. Can you state about when that date was?

A. I have since found out that it was about 1871. I thought it was much earlier.

Q. You were asked what you would have done with the Kelly apparatus if it had been put to you in the year 1864, with reference to the knowledge of the state of the art then, in regard to its being put in a closed room or in the open air. If you had been handed the certified model of the Kelly apparatus and had been told that it was a device for cooling carcasses, in what way would you have located it?

Mr. CONKLING: I object to that.

Mr. DICKERSON, Jr.: It seems to me that it is entirely competent.

168 The COURT: The witness has already stated and many times his theory—his idea of the Kelly patent.

Mr. DICKERSON, Jr.: That is true; but I am not asking about the Kelly patent. These gentlemen went entirely outside of the Kelly patent, and they asked him what he would have done with the Kelly apparatus, independent of the instructions in the patent. I objected to that at the time.

Mr. BENNETT: He answered it.

Mr. DICKERSON: Precisely. He did answer that, and it is precisely with reference to that question that I am now on the redirect examining the witness, as I judge that I have a right to do, in view of that cross-examination. I ask him now simply to this extent: If he had been given the Kelly apparatus, with the instructions that it was an apparatus which was devised for the cooling of carcasses, how would he have located it?

Mr. CONKLING: I object to that.

Mr. DICKERSON, Jr.: We claim, among other things, that the Patent Office model is a part of the patent, and it has been so decreed by the supreme court, and that it is to be used in connection with the construction of the patent. There is a little point in connection with the model, which is independent of the patent itself.

The COURT: I do not really think that that is admissible on the redirect. Of course, the expert, when he testified with regard to it, must have had in his mind the construction of the patent in suit; but this witness has been cross-examined and has given very

169 fully his theory of the construction of the patent, not because that construction—his construction—is evidence, but for the purpose of showing what his idea is with regard to it and what his testimony with regard to it is based upon. Now you seek to go back

and to ask him over again where he would have located this thing if he had been shown the patent in 1864. That is simply asking for his construction of the patent.

Mr. DICKERSON, Jr.: That is not my question. That question, of course, would not be competent now, but that is not my question. I am cutting loose entirely from the patent, so far as this question is concerned. These gentlemen asked Mr. Brevoort, cutting him loose from the patent and from his construction of the patent, and looking simply at the apparatus independently of the patent, how he would have located that apparatus independent of the patent itself. My question has reference to that, merely supplementing it with this: Defining what I mean by the Kelly apparatus—namely, the thing in the certified model—and stating that it is an apparatus to cool carcasses. I do not now refer to the patent.

The COURT: Do you mean to ask him whether he would locate it in a room or on a plane out of doors?

Mr. DICKERSON, Jr.: Yes; the apparatus, independent of the patent. These gentlemen choose to take that view on cross-examination, and I think that I have a right to ask that.

The COURT: Well, I will take that.

170 Mr. CONKLING: I wish your honor would allow us to note an exception. I object to it as incompetent, and also because the witness has been fully examined in every part which in any view would be competent.

The COURT: I am pretty nearly of your mind; but I do not think that it is of enough consequence to rule it out if he wants it in.

Mr. CONKLING: Very well; if followed by no other question, I concede that your honor is right.

Mr. DICKERSON: I have offered in evidence the certified model, and the same is marked "Plaintiff's Exhibit Kelly Certified Model."

171 A. I should have located it inside of an apartment, a portion of which apartment is shown in the certified model. I should have so located it that I could have used the air over and over again.

Q. Some reference has been made to a machine which was in use in the Capitol, in Washington, for cooling air, in your cross-examination. Have you any knowledge that that machine was put in use there, or what became of it?

A. I have no actual knowledge. I believe it was a failure.

Mr. BENNETT: Hold on. What do you say you believe it was?

The WITNESS: I believe it was a failure. I do not know.

Mr. CONKLING: I move to strike out that answer.

The COURT: He said in his testimony with regard to that apparatus at the Capitol, in the first place, that he did not know anything about it.

Mr. CONKLING: And now he expresses an opinion on what somebody has told him, that it was a failure.

Mr. DICKERSON, Jr.: I have no desire to have the last part of the

answer in. That may be stricken out. I simply asked him with reference to the date.

Mr. CONKLING: That, I think, is competent. I want to ask him one question on recross-examination.

Recross-examination by Mr. BENNETT:

Q. Shall I understand you to testify that you would have put in a closed apartment, to which the outer air had no access, that apparatus, if you had been shown it and told that it was an
172 apparatus for cooling carcasses where hung to cool in slaughtering establishments?

A. Yes; I should.

Q. So that you mean to say that that information would have conveyed to your mind that, in place of that being an apparatus applicable generally to slaughtering establishments where carcasses are hung to cool, it must be confined to some apartment from which the air was excluded. Do you mean that?

A. I do. If I was shown that apparatus that is the way I should use and locate it.

Q. You have testified that you find on further investigation that this Lyman device, in reference to which you have testified, was not patented until 1871. At the time of your——

Mr. DICKERSON: He has not testified to any such thing.

Mr. CONKLING: He said the Lyman patent.

Mr. BENNETT: I will modify my question.

Q. You have testified that you find on further investigation that the Lyman patent, with reference to which you have testified on cross-examination, was dated in 1871. Did you not know at the time of giving that testimony that the plaintiff in this case had conceded that the Lyman car, as shown in that patent, was invented and put into public use as early as 1854, or prior to the Kelly patent?

Mr. DICKERSON, Jr.: I object to that. There is no reference to it on cross-examination, and it is utterly immaterial. The fact is that there were two sets of devices—certain Lyman devices, about which we will have no dispute, and a Lyman patent. The Lyman
173 patent was different from the Lyman device and was taken out many years ago.

Mr. BENNETT: I will show that this witness had full knowledge of the fact, during his cross-examination, that this plaintiff, who now owns the Lyman patent, did file in the Patent Office a concession of priority in favor of Lyman over Kelly. I only want to show that at the time that Mr. Brevoort gave that testimony he gave it with the full knowledge of the fact that the thing existed as early as 1854.

The COURT: He so stated, yesterday afternoon, when he spoke about the Lyman car, and he put the Lyman car back into the 60's. Now, the question is directed merely to the Lyman patent, I suppose, for the purpose of clearing up what may be somewhat obscure.

174 Mr. BENNETT: There will be but one more question, I think.

Q. (Reads.) "You have testified that you find on further examination that the Lyman patent, with reference to which you have testified on cross-examination, was dated in 1871. Did you not know at the time of giving that testimony the plaintiff in this case had conceded that the Lyman car, as shown in that patent, was invented and put into public use as early as 1854, or prior to the Kelly apparatus?"

A. I did not know that the plaintiff has so stipulated.

175 HENRY MORTON called and examined as a witness in behalf of the plaintiffs.

Direct examination by Mr. DICKERSON, Jr.:

Q. Will you please state what your profession is and what your experience has been?

A. I am the president of the Stevens Institute of Technology, and I have devoted my time ever since I left college to the subject of scientific research, both in the subjects of physics and mechanics, and to some slight extent in chemistry.

Q. Will you state whether you have been heretofore called upon as an expert witness with reference to the construction of patents in suits pending in the United States courts; and, if so, to what extent.

A. I have been very frequently called during the last fifteen years—in fact, almost constantly employed in that way—at such times as I was at liberty from my other duties.

Q. Will you tell me whether you have in the course of your professional duties had occasion to make an examination of the question of refrigeration and of some of the patents relating thereto?

A. I have, in various connections.

Q. Have you had occasion to make personal observations with regard to the effects of refrigeration in such apparatuses?

A. I have.

Q. Especially have you made an examination of the reissue letters patent to Kelley here in suit, and do you understand the same?

A. I have examined the patent carefully, and I believe that I understand it.

176 Q. Have you likewise made an examination of the model here in evidence of the defendant's apparatus, with reference likewise to the Coleman patent relating thereto, so as to be able to understand the model?

A. I have, and believe that I understand the model.

Q. Will you be good enough to explain somewhat in detail to the court the operation of the defendant's apparatus, and especially the compressing and air-cooling part of that device, pointing out fully to his honor the operation of each part of that device?

A. In this apparatus the air is withdrawn from the chill-room or cooling apartment through this box, in the first instance. It is done by a leader pipe here, and then taken into the compressing cylin-

ders, where the air is compressed. From those compressing cylinders the air passes first to what would be technically called a scrubber or apparatus where it is brought in contact with the spray of water, whereby a good deal of the heat is communicated to the water—the heat produced by the compression of the air. It then passes from that scrubber, in this part of the apparatus, to an apparatus containing a number of perforated discs or diaphragms, by which the spray or water mechanically carried is separated out. From that the air, still under pressure, passes by means of a pipe, which is represented here in the other model, back and forward through this series of small pipes, which is in the passage of the outflowing air from the cooling chamber. In these the air, partly
cooled, cooled to a temperature—I do not know the exact
177 temperature, but I presume to a temperature of 100 degrees
Fahrenheit or somewhere about that—*it* passes back and forward through these pipes, and thereby becomes further cooled, availing itself of the cold of the escaping air from the chill-room, which, even when it escapes, has still some cold in it. From there the air, the compressed air, passes to a cylinder (which I believe is this one on this side) in which it is allowed——

Mr. BENNETT: That is, the steam cylinder.

Answer (continued). I cannot recollect precisely, but on this side, where it is allowed to expand, or it expands behind that piston, and thus aids the steam cylinder in producing the compression. The exhausted air, or the air that passes from that cylinder, then passes into the passages which, I think, are these (indicating), right and left to what are called snow-boxes, which are merely large portions of the conduit or pipe with a trunk on it—the main pipe—where the snow which is formed here, or frozen vapor, at this point of its expansion, the main expansion being that which takes place in the cylinder, and possibly in its exit, to some extent, from that cylinder, produces a very sudden accession of cold; and, notwithstanding all the previous drying, there is vapor enough left in the air so that when it is thus suddenly cooled that vapor is frozen and deposited as snow in this snow-box, from which it can be taken from time to time; thence it passes from these trunk leaders or pipes on
either side, and from thence, in the cross-pipes, the air is led
178 off and distributed to all the different points of the chill-room.

Q. Will you please compare the apparatus you have just described with the apparatus which is described in the Kelly reissue and specifically pointed out in the fifth claim thereof, taking up such dissimilarities as you may discover?

A. In comparing those two structures I find the following similarities: In each of them I find a means of producing cold or of cooling air. In the one case it is represented as an ice-box, through which air passes, being brought in contact with the ice, and in the other case it is more or less a complex system of mechanism where the cold is obtained by forcing the heat, as we may say, out of the air and getting it into some sea water, which sea water runs off again and carries that heat away, thereby cooling it ultimately, on

further expansion; but the actual point at which the heat is taken out of the air is the point where the water comes in contact in that part (indicating) of it, and there is a little further heat taken out at this (indicating) part. I say "taken out," but it is rather a redistribution. By "that point" I mean the coil. We have then, in this mechanism, in this air compressor, &c., the equivalent, as I understand it, of the ice box indicated in the Kelly patent. Then, as the equivalent of the fan-blower, we have the pistons of the compressing cylinders. It is by those pistons, and by those only, that there is given to the air a motion or force by which it is made to circulate and everything else is carried out. It is perfectly
179 true that this air afterwards passes through a cylinder where it is made to do some work; but in this relation the piston of that cylinder is merely an obstruction placed in the road of the escaping air. If the air passes out, as far as the question of circulation goes, it would more easily pass out if that was not there. It is simply an obstruction in that sense; but it is a useful obstruction, in view of the ultimate object, because it saves in economical operation of the apparatus force that otherwise would be put in the wrong place and do harm instead of going to the right place to do good. The equivalent of the fan-blower is found in the pistons of those compressing cylinders. Therefore I find the system of distributing pipes, of which I should say that the larger trunk pipes or main pipes are equivalent to those indicated by the letter T in the drawing of the Kelly patent, and the smaller pipes indicated by *t* are these small branch pipes.

Q. Will you please point out the effects of the ice upon the air with reference to refrigeration and purification in comparison with the same effects, if they are produced, in the defendant's device?

A. Whenever a current of air, under ordinary conditions, is blown over or carried over ice it is, as matter of course, chilled, and in the process of chilling the moisture in the air is, to a greater or less extent, precipitated, and in that precipitation or formation of cloud it carries with it impurities that may be present in the air, and these fall upon and stick to the ice; and ice has been proved by
180 experiment to have a great affinity in the cleansing of air as well as in the cooling of it, when the air is driven over ice, so that air driven over ice is not only cooled, but it is dried, the moisture thrown out as a cloud in the air sticking to the ice—becoming removed from it, and the air is also purified. Now, in the defendant's apparatus that purification of the air take place substantially where the expansion occurs in the expanding cylinder and in the snow-boxes. At that point largely (although not to a slight extent elsewhere), when this snow is precipitated, the impurities are taken out, and the moisture is taken out as well as cold produced. Some impurity and some moisture is, of course, taken out from the coil where the previous cooling takes place, as the water runs from that coil, which moisture is removed from the air, and that water will then contain some of the impurities.

Q. Will you please state whether the method of refrigerating, cooling, and purifying air by the process which you have just de-

scribed was well known prior to 1864? I do not now refer to the specific details of the apparatus.

A. As a general method, it was well known. In other words, it was well known that by the compression, cooling, and subsequent expansion air could be cooled to the extent of going below the freezing point, and therefore cooled to such an extent that the moisture and impurities would be removed.

Q. Will you please state whether any other or different result than that is accomplished by the defendant's apparatus which you
181 have described? I do not now refer to the distribution of the air, but simply to the operation of the cooling part of the apparatus.

A. There is, as far as I understand it, nothing done to the air in the defendant's apparatus which is not the equivalent of and substantially in the same way done to it in the Kelley apparatus.

Q. Some question has been made here with reference to the action of the air in the auxiliary cylinder which aids in the compression of the air. In your opinion, is there any different effect produced upon the air by reason of its action upon that piston than would be produced if it were allowed to expand from its original condition of compression to its ultimate condition of expansion without the intervention of that cylinder or piston?

A. No difference of effect. The use of that piston is this: That by its use the ultimate temperature of the air is somewhat lower than it would be if that piston were not used and that cylinder, and for this reason, that if the compressed air, under conditions otherwise identical, were allowed to escape directly into any passage into these pipes or anywhere else in the act of so expanding vibratory motions would be developed in the nature of the heat, the outrushing particles of air would vibrate, and a portion of the heat would thus be produced from the energy contained in them due to the compression—the elastic force. It would partly be converted into heat, just where the heat would be not only useless but objectionable. On the other hand, if a certain amount of that motion
182 energy of certain particles of the air is expanded upon the piston of this cylinder, it is there converted into heat, which might be carried off by machinery, by shaft, or belting as motion in the form of motive energy and be converted into heat somewhere else. In this particular machine that heat, being converted into movement, is carried to the pumps and helps the work of compression, so that what otherwise would be a loss, as the right thing in the wrong place, now becomes of use, because it is applied just where its work can be useful instead of detrimental.

Q. So far as the action of the air in the chill-room of this apparatus is concerned, is there any difference in its result and operation there in the Kelley apparatus and in the defendant's apparatus, assuming it to issue at the same temperature in both cases?

A. None whatever.

Cross-examination by Mr. BENNETT:

Q. Did you testify as a witness in the case or did you make an

affidavit which was used on the motion for an injunction in this case in which this apparatus was involved?

A. I believe I did.

Q. In the case of the Bate Refrigerating Company against Joseph Eastman *et als.?*

A. Yes; I did.

Q. Have you had occasion on this occasion to refer to that affidavit or to the two affidavits which you made and used on that occasion?

183 —. I have not specially examined these affidavits; I have had them in my hand.

Q. On that occasion, when you examined this defendant's apparatus and compared the same with the Kelley patents, did you not find and state in your affidavit that the infringement was only as to the first and second claims of the Kelley reissue?

A. I presume that, having been asked in reference to the first and second claims, I confined my statement to those.

Q. Your recollection is sufficiently clear, without reference to these affidavits, to state that on that occasion you found infringement only of the first and second claims of the Kelley patent?

A. I cannot say from recollection at all as to that?

Q. Will you refer to those affidavits which you have in your hand and state positively whether on that occasion you did not testify that there was only an infringement of the first and second claims?

A. I think I have the passage to which you refer, on page 16, folio 48. It is not true that in that affidavit I stated that the infringement was confined to the first and second claims, but it is true that those were the only claims whose infringement I ever stated that I believed existed.

Q. That is, in other words, you did state in those affidavits that you found an infringement of the first and second claims of the Kelley reissue?

A. Substantially. I did not undertake to say what was the infringement, but I found those parts of the apparatus.

184 Q. And did you not on that occasion take the position that it was immaterial as to the means by which the air was cooled, so long as the air was cooled, as to its being or not being the equivalent of the Kelley ice-box.

A. Substantially, provided the means were substantially similar.

Q. By "substantially" similar do you mean any known means of producing cold of a degree sufficient to act as a means for reducing the temperature of a compartment to the freezing point?

A. Any means consistent with the use of the other instrumentalities involved.

Q. That is, any means consistent with the use of the fan and distributing conduits?

A. Precisely.

Q. I think you have said that the fan was not absolutely necessary, either, have you not?

A. As another element, yes; as another element aside from the cooling.

Q. All that is necessary is, in your opinion, that you must have some means for expelling the cold air?

A. Some means which shall operate as a fan operates, in some sense.

Q. Do you understand that a piston operates as a fan operates?

A. Substantially, for such a purpose as that.

Q. Is not the motion of a fan continuous, and is not that of a piston vibratory or pulsatory, back and forth?

A. There is extremely little difference between the two when applied to driving of air.

Q. But there is some difference?

185 A. Very little; a slight degree of difference. Both are pulsatory in that sense. Any one who has stood before a blower knows that there is a regular throb; that as the fan goes by the outlet orifice there is a distinct throb. It is a rotary piston arrangement instead of a reciprocating piston.

Q. Would it be incorrect to say that a fan-blower gives a uniform current (which is a matter of the utmost importance), while other apparatus, such as the piston, &c., necessarily gives an intermittent and varying current of air? Would that statement be correct as a distinction between the operation of the fan and the operation of the piston?

A. I do not think so, unless under very peculiar circumstances.

Q. There would be some circumstances, then, you think, under which that would be the difference?

A. There might be. I can imagine the piston so arranged that it would only be acting one way, for instance. It would give a puff, and then you would have to wait until it came back and gave another puff.

Q. Have you ever made a personal examination of refrigerating apparatus consisting of fan, ice-box, and conduits to see how the cold air came into the apartment; whether in a continuous current or by puffs?

A. Substantially in a continuous current wherever I have seen it.

Q. Have you ever examined a refrigerating apparatus in which compressed air was used and the propelling force was a piston

186 to see whether it acted continuously or by puffs?

A. No; I have not examined that.

Q. Would it surprise you at all, from your standpoint, if it should turn out to be the fact that in defendant's apparatus the cold air is introduced by puffs instead of in a continuous current, as by the use of a fan?

A. It would surprise me if this irregularity was very noticeable.

Q. I suppose you could readily determine that point by going to the snow-chamber and taking out the lid through which access is gained to the chamber and by which the snow is removed and seeing how it was introduced, could you not?

A. That would not be a good place to test it. It would be very much better to go to the outlet.

Q. Why would it not be a good test when that is the place where air is first introduced to the cylinder?

A. Precisely for that reason, that all the irregularities would be greatest there, and would be diminished by the space into which it passed.

Q. Then you think we ought to go to the point remotest from the ice-box and where it would be the least noticeable?

A. No; I think to find the effect of a given thing you should go where that effect is important, and not to some other place where you get something else, which is not that effect.

Q. Suppose it should be a fact that there is a difference in the operation of the fan and of a piston, such as is used in defend-
187 ant's apparatus, would that make any difference in your mind as to saying that one was the equivalent of the other?

A. Not so long as that difference did not make a radical difference in the effect of the thing.

Q. What would you term "radical difference" sufficient to make that thing an equivalent?

A. Such a difference as would interfere with the operation of the machine and prevent the equable distribution of the air or in any other way upset the organization.

Q. Suppose, for instance, that the operation of the piston was such that at the end of its throw it would stop perceptibly and then return again so that the air was introduced in regular puffs, would that in any way interfere with the equable distribution of air if the conduits were managed properly?

A. No; I think if the conduits were properly adjusted to it it would help matters—that is to say, you would not need quite so many openings in the conduit in that case. The puffing would stir up the air a little and take the place of having so many openings.

Q. In view of all you have stated, are you still of opinion that any means that forces the air into the refrigerating compartment is the equivalent of the fan?

A. Any means consistent with the operation of the device.

Q. That is, any means that would not interfere with the operation of this apparatus and produce cold?

A. To produce the effect that is intended—to cool carcasses, grain bins, &c.

188 Q. Is not that accomplished by reason of reducing the temperature of the air?

A. That is one of the steps in the process.

Q. Then any means of forcing the cold air out you would consider to be the equivalent of the fan in the Kelly apparatus so long as it is not such an arrangement as interferes with the workings of the apparatus that produces the cold?

A. Of course, understand that I mean that you will draw it in, too.

Q. Would it make any difference in the defendant's apparatus as to its mode of operation, mechanically speaking, if you did not draw the air in?

A. You could not force it out if you did not draw it in.

Q. Suppose you drew it in from the outside; suppose you took the external air and compressed that and then expanded it and expelled it the operation of the machinery would be precisely the same, would it not?

A. It would be in very many respects the same. You would lose a great deal of economy in the operation of the machine. It would be very wasteful, but its various mechanical operations would be the same.

Q. In what respect would it be wasteful?

A. Instead of taking the air from the chill-room at a low temperature, and therefore simply having to remove a small amount of heat from it, you would take the exterior air, which many times would be very hot, and as you must do something with the air from the chill-room as you go on pumping it in, when you expelled it from
189 the chill-room you would expel it still containing cold (I use that term for convenience), and therefore you would be throwing away that much cold.

Q. But would it not likewise also contain a large percentage of impurities which would have to be got rid of before you could bring the air back to the refrigerating apartment?

A. It would contain certain impurities which are gotten rid of very readily in either of those forms of apparatus.

Q. You must get rid of those impurities, otherwise they would destroy the effect of the refrigerating apparatus?

A. It is desirable to get rid of them, although I would not say that the apparatus would not work if they were not gotten rid of.

Q. Suppose that you were out and in mid-ocean, would the sea air which would be drawn into the freezer be in as pure a state as the air which was thrown out of the compartment after it had come in contact with the carcasses?

A. Of course it would be purer than the air which had been in contact with the carcasses. At the time the air left the carcasses it would be less pure than the sea air.

Q. Then there would be, so far as the question of impurity was concerned, some advantage in taking the outside air into this apparatus and throwing back the air that had already come in contact with the carcasses?

A. There would be no advantage of operation, because the impurities are removed anyhow.

Q. But there would be an advantage to the extent that you are dealing with purer air?

190 A. If that is an advantage I cannot see it; but there would be that advantage.

Q. Would not that be an advantage if you had no means for washing out the impurities?

A. If there was no means of getting the impurities out it would be a very great advantage.

Q. But the operation of the machine in every respect, so far as the mechanical working is concerned and so far as the character of the air which is expelled into the refrigerating apartment, would be precisely the same whether you used the outside air or not?

A. It would be substantially the same, as far as that goes.

Q. You have said that it would be a waste to take any outside air. By that I suppose you mean that it would be a waste of steam-power?

A. It would be a waste of power—a very serious waste of power.

Q. Would you consider it very serious from the money standpoint if it turned out to be the fact that the defendants paid so much for steam-power whether they took the outside air in or used the same air over and over?

A. It would not be serious to them, but it would be serious to the man who supplied the steam-power, and probably would end in reacting on the user.

Q. Suppose that you take the outside air in and introduce that into the apparatus and operate and work precisely the same,
191 you could get almost any degree of temperature you desired in the defendant's apparatus, could you not?

A. I think you could make it very cold.

Q. Have you ever read any discussion with reference to the Bell-Coleman apparatus? I refer especially to those which took place before one of the scientific societies of Scotland about the time that the Bell-Coleman apparatus came out.

A. I have not read that.

Q. In the Kelley form of apparatus, suppose you were to take the outside air what would be the effect?

A. If you were to modify the Kelley apparatus so as to take the air from the outside, and then expel the air afterwards, it would, of course, greatly decrease the economic efficiency; but just how much harm it would do would depend upon just how much you managed the affair. I could not give you any general description which would suit the various cases.

Q. Would it not, under such circumstances, become, strictly speaking, an air cooling and distributing apparatus?

A. I should say that it would, under those circumstances, become rather a ventilating apparatus; then its chief office would be to ventilate, and, as a side issue, it would do a little cooling.

Q. It would ventilate by reason of the introduction of the fresh, cold air?

A. The ventilation would be complete whether the air was cold or hot.

Q. But assume that the outside air came in contact with the ice the same as in the Kelly apparatus, then you would have
192 something more than the outside air—that is, you would have purified, cool, dry air?

A. Yes; that would be air purified to a certain extent, and to a certain extent cooled.

Q. Then you would have (if you prefer your term "ventilating apparatus" to mine of "distributing apparatus")—then you would have an apparatus which would be suitable for cooling hospitals, halls, and buildings of that class?

A. Yes; precisely; it would then belong to the art of ventilation

and not to the art of refrigeration and preservers of meat, &c.; it would be quite another thing.

Q. Then you make a distinction between cooling and ventilating and refrigeration?

A. I draw a distinction between ventilating, as the primary thing (with the side issue of cooling), and the chilling or cooling, as the primary object, without any special point in the direction of ventilation.

Q. Now, just give us your definition of refrigeration.

A. Refrigeration, as an art, is that art of preserving perishable articles, animal or vegetable, by reducing their temperature to a poin at which putrefaction, fermentation, and the like will not take place.

Q. Or, more accurately speaking, by reducing the immediately surrounding temperature, and in that way reducing the temperature of the articles themselves?

A. That is a means of obtaining the end. The object

193 is to cool the articles by means of cooling the air itself.

Q. The means is the chilling of the adjacent air?

A. As a rule. The body might be chilled directly, but, as a rule, it is chilled by chilling the air.

Q. Refrigeration means preservation, as I understand it—that is, the preservation of perishable articles?

A. That is a far wider range of the subject, because we can preserve perishable articles by heat as well as by cold, and by the use of antiseptics and fifty other things. Refrigeration is the preservation by cold.

Q. Do you find anything in the Kelley patent that speaks of preserving meat or other carcasses? And, if so, I wish you to quote that part of the patent.

A. I find at the opening of the patent that the inventor states that he has invented "a new and useful improvement in air cooling and distributing apparatus for cooling carcasses where hung to cool in slaughtering establishments, cooling-halls, railroad-cars, grain-bins, holds of vessels," &c. I need not read further; that covers the point.

Q. May I enquire whether, in reading that, you read "cooling-halls" as a compound word or whether you read it "cooling halls?"

A. I read it as a compound word. I so understood it. The structure of the sentence makes it very plain that that is what was meant.

194 Q. Have you looked at that? I think if you will read it you will see that it is intended to be read the other way: "For cooling carcasses where hung to cool in slaughtering establishments." The object is the cooling of carcasses; it is simply a description of where they are hung. Then it is to be used also for cooling halls, railroad cars, grain bins, the holds of vessels, and other places and apartments in which it may be desired to reduce the temperature of the atmosphere; otherwise you would have to hang your carcasses up in grain bins, &c., which you see cannot be the intent.

A. I considered that that was a compound word, because it is followed by a series of other compound words, each of them divided by a comma, just as this is.

Q. Each divided by a hyphen, you mean, as "railroad-cars," with a dash between the railroad and the cars?

A. There is no dash; I do not refer to the dash. Each of these parts has a comma separating it from the rest.

Q. But do you not see that your construction would require you to hang your carcasses up in grain bins? If you read it "cooling carcasses where hung to cool in slaughtering establishments, cooling halls, railroad-cars, the holds of vessels," then you would have to hang your carcasses up in grain bins, would you not? Is the original of the patent here? If it is it ought to be shown to you. I am told there is a semicolon after "slaughtering establishments," which makes the meaning entirely clear?

195 A. If such were the punctuation——

Q. The original may be here, and if so you are entitled to see that.

Mr. DICKERSON, Jr.: I will say that we make no point on the construction, one way or the other.

Mr. BENNETT: But the witness may not make the same construction.

Mr. DICKERSON, Jr.: I have here a certified copy, and I find it is as printed. There is simply a comma.

Mr. CONKLING: I think you had better have him state in what sense he does read that, because it changes the effect of the answer which he is going to give.

Mr. BENNETT: He may state that, if he will, so that we may be fully advised as to how he considers it.

The WITNESS: I do not myself consider it a material point. But as I read it, noticing these commas, it struck me that the probability was that the dash was omitted; but I may be wrong in that.

Q. Would it not necessitate your understanding, if you
196 read it in that way, that the carcasses were hung up to cool in slaughtering establishments; that carcasses were hung to cool in cooling halls; that carcasses were hung to cool in railroad cars, and that carcasses were hung to cool in grain bins. That would follow, would it not, from your present idea?

A. It would, as the strict grammatical construction; but the only explanation then would be that it was a carelessness in expression on the part of the patentee. There is only one point where it would be inconsistent. The carcasses might be hung everywhere else but in a grain bin. They might be hung in railroad cars, in the holds of vessels, &c., and it would suit the patent perfectly well.

By Mr. BENNETT:

Q. It would be consistent to leave it "cooling halls, railroad cars, grain bins, the holds of vessels, and other places and *the* apartments in which it may be desired to reduce the temperature," would it not?

A. It would, undoubtedly.

Q. And so reading it, and considering those words alone, would it not imply to your mind that it was a cooling apparatus as distinguished from a refrigerating apparatus, considering the definition of refrigeration such as you have given?

A. No; I should consider that that was merely an added suggestion of use; that primarily it was a refrigerating apparatus, and that it was suggested that that might be used on an occasion elsewhere than for the simple purpose of refrigeration. It is not inconsistent.

197 Q. But do you not find it stated anywhere in the patent that this is an apparatus for the preserving of carcasses, or for refrigeration?

A. Not to limit it specifically to that. It merely suggests that as one of its uses, and that the parallel uses are the rest of them.

Q. You do find it, however, stated in this patent that it is an air cooling and distributing apparatus for cooling halls and other places in which the temperature is to be reduced, do you not?

A. I do.

Q. Now, suppose that you were told the Kelley apparatus was an air-distributing apparatus, for the purpose of reducing the temperature of halls, &c., would that convey to your mind that this was to be only used for preservation or for refrigeration, or would it convey to your mind the idea that it was a temperature-reducing machine, so as to make a building in warm weather agreeable?

A. If that were the only description of its use and intention I should consider that it conveyed some such idea, if nothing else than that were referred to.

198 Q. I understand that you do draw a distinction between the refrigeration and cooling. Is that correct?

A. Yes.

Q. Within you own experience have you not discovered that it is very necessary indeed to cool some things that do not require refrigeration for preservation. As an illustration, is it not absolutely necessary to cool a carcass of meat or permit the animal heat to go out before it is used, while it may not be necessary, if it is intended for use within a day or two, to submit it to refrigeration?

A. That is true.

199 Q. Then Kelley is correct in his statement in saying that this is an air cooling and distributing apparatus for cooling carcasses, and in making that statement he must have had in view mere cooling in contradistinction to refrigeration?

A. Not as I understand the patent, taken altogether.

Q. What is there in the patent, taken altogether, that would give you any other understanding than that this was to be a machine simply for cooling, in contradistinction to refrigeration, as you have defined that word?

A. A consideration of the use to which it was to be applied—of the apparatus itself—and a general knowledge of the state of the art, including the application of common sense.

Q. You say, "the use to which it is applied." Is it not the fact

that — every use mentioned in the patent and to which he says — is applicable it would be an advantage, too, as a cooling apparatus?

A. I do not think that it would be of any use, as a mere cooling apparatus, in a slaughter-house or for railroad cars or grain bins or for the holds of vessels.

Q. Leaving out of consideration for the time being the cooling of carcasses in slaughtering establishments, is it not the fact that as to all the other uses there named it would be far more applicable as a cooling apparatus than as a refrigerating apparatus?

A. Not in my opinion. It would be quite useless, as I think, in a railroad car as a simple cooling apparatus, or in a grain bin or in the hold of a vessel.

200 Q. Is it not the fact that the only perishable article mentioned in that patent to which this thing is to be applied is meat—carcasses?

A. It is the only one specified; all others are implied.

Q. And is it not likewise the fact that when it speaks of carcasses it says that it is for cooling them when hung in a special place, and without reference to other uses to which this apparatus is to be applied?

A. It does not mention carcasses in any place specifically except as in slaughtering-houses.

Q. Would there be any need of a refrigerating apparatus in a public hall; and, so far as that is concerned, would it not be more reasonable to say that, as applied to a hall, it is a mere ventilating apparatus?

A. In my own opinion, such an apparatus as this would not be useful in a public hall at all.

By Mr. CONKLING:

Q. He asks you, if it was used, would it be as a refrigerating apparatus or would it be as a cooling apparatus?

A. If used in a public hall, with an audience present, it would be as a cooling and not as a refrigerating apparatus.

By Mr. BENNETT:

Q. In the ordinary acceptation of the term "hall" you would not understand that there was anything in it about preserving or refrigerating, would you?

A. No; it does not convey that idea.

201 Q. Therefore, confined to a hall alone, it would seem somewhat unreasonable to say that this was a refrigerating apparatus, would it not?

A. When so used.

Q. Suppose that we proceed to railroad cars. With the exception of some few perishable articles, most of the merchandise which is transported in railroad cars is not of a perishable character, is it?

A. And it is not either cooling or refrigerating in the slightest degree, as applied to those.

Q. Suppose you had the car loaded with fresh grain, would it not need refrigeration to keep the car from heating?

A. None that could be applied with any such apparatus as this.

Q. Then, in your opinion, there would be no advantage, if a car were loaded with fresh grain, to have on the car an apparatus of this kind, which would keep constantly introducing cold air, and to the extent of the cold air introduced crowding out the warm air?

A. If you had a car full of grain you could not operate this apparatus in it at all, and if it was empty you would not need to.

Q. Do you understand that the Kelley apparatus is only to be used, and that it could only be the Kelley apparatus when it is used, in an apartment to be cooled?

A. I understand that the intention of the inventor was that it should be put in and used in an apartment to be cooled.

Q. From which it follows that you would not have, as you understand it, Kelley's patent and Kelley's apparatus unless
202 the apparatus itself was in an apartment which is to be cooled?

A. No; that is not my understanding of it. It would be the Kelley apparatus wherever it was used, but it might be as useless, for instance, as has been illustrated, as a stove put up in the park, but it would, all the same, be a stove.

Q. But you would get some heat from that stove, even if it were out in the open air.

A. Yes; but for the purpose of warming an apartment (that being the object of stoves) it would be useless.

Q. I suppose you have heard of kindling fires in the open air or placing a stove in the open air to warm bodies, have you not?

A. To warm bodies, no.

Q. You have not?

A. I have heard of kindling fires to cook with out of doors.

Q. Have you never seen tramps by the wayside making a fire in order to warm themselves on a cold day?

A. Yes.

Q. And they get some benefit from the fire, even though it is out in the open air?

A. Yes.

Q. What I want to know is, without reference to the degree of benefit, whether you understand that it would or would not be the Kelley apparatus if the apparatus was outside of the apartment to be cooled and only that portion inside which is designated by the letters *t t t*?

A. That is another question. It would depend upon the arrangement of the apparatus, but my impression is that it would be the Kelley apparatus not used in the manner indicated in the Kelley patent.

203 Q. Would that take it beyond what you understand to be the boundaries of this patent, in your opinion?

Mr. DICKERSON, Jr.: Is not that rather a question of law?

Mr. BENNETT: I think not. I ask for his own opinion as matter of fact.

A. It might; it would depend upon the nature of the arrange-

ment. You ask me a question which might involve any sort of combinations.

Q. Suppose that part of this apparatus—in fact, all of this apparatus except the system of distributing pipes—were placed outside of a car or in a part of the car penned off from the balance, in which grain was loaded for transportation, and that it was the identical Kelley apparatus and operated precisely as Kelley says that it is to operate, would it not perform a useful part, and would it not be the Kelley apparatus?

Mr. DICKERSON, Jr.: Will you state where the inlet opening is, whether outside or inside?

Mr. BENNETT: Let Dr. Morton state that.

A. If the inlet opening was disconnected so that fresh air were drawn in, and that air was passed into the car, I do not think it would be, under those conditions, the Kelley apparatus as indicated in the patent.

Q. Then we may conclude that branch by saying that you admit that it is identically Kelley's apparatus used as it is only capable of being used, the only difference being that you take in outside
204 air instead of the air of the compartment. Such an apparatus would not be within your understanding of the Kelley patent?

A. My impression is that it would not be the Kelley apparatus used as described in the Kelley patent.

Q. And it would be, as you understand it, beyond what you consider to be the Kelly invention?

—. I understand Kelley's invention to be a combination of three things, so used as to produce a certain effect. The three things are the ice-box, the blower, and distributing pipes, so used as to produce a uniform circulation and cooling throughout the apparatus, throughout the apartment.

Q. Then whether you have the Kelley patent or not, in your opinion, depends upon the manner in which it is used?

A. Upon its being used so as to produce the effect indicated.

Q. To produce what effect?

A. The effect of cooling uniformly, by a uniform distribution in the apartment.

Q. By distribution you mean a distribution of the cold air to be introduced into the apartment?

A. I mean a distribution of the air as it is introduced and after it is introduced and all the time that it is in the apartment.

Q. Is there anything in the Kelley patent which refers to the distribution of the cold air after it has once been introduced into the apartment?

A. That is just what is referred to—that is to say, the ob-
205 ject of introducing through many pipes is not to have a great many pipes there or to have the air introduced at a great many points, but that in consequence of that it should be distributed through the whole room by being introduced in a great many places. If you introduce it in a great many places, but put up a

screen by which you carry it all right back to the entrance, you would not then be carrying out Kelley's patent.

Q. The equalization referred to in the Kelley patent, then, is the introducing of cold air into various parts of the apartment to be cooled?

A. Introducing it from the pipes and from the ice-box.

Q. Would not that be the fact whether you used the outside air or not, so far as concerns the equalization of the cold air introduced?

A. That would depend upon the special construction, as I can see. It might be possible to manage it so as to get that equal distribution, but it is vastly easier to get it if you take the air out while you are putting it in.

Q. Tell me why it is vastly easier to get an equal distribution of the cold air through numerous openings provided when you are taking the warmed air out of the apartment.

Mr. DICKERSON: That is not what the witness said.

A. It is easier to do it by taking the air out of the apartment in the manner shown in the Kelley patent, because while the air comes in at these various points a draft is produced at the lower part into the ice-box, and thus the cold air introduced is drawn grad-
206 ually in and the circulation kept up in the room.

Q. Would not the cold air go right down and pass through the apartment almost in a straight line from that point at which it was injected, owing to the fact that it was so much heavier than the air contained in the apartment?

A. Only to a limited degree. The difference in weight between hot and cold air is very slight, and there is also a little friction. Experiments which I made years ago on ventilation showed me that air flowing into an apartment will disturb gradually the surrounding air to some extent, so that it will not go in a direct path as it enters.

Q. But the cold air is bound, sooner or later, to find the lowest level; is not that true?

A. No; not if it is being drawn out rapidly at some other level, for example.

Q. But suppose that is not being drawn out, would it not then find its lowest level in the apartment?

A. If such a thing were possible that you could pour cold air into an apartment without letting any out, then perhaps the thing which you suggest might happen; but I do not know how then the air could be purified.

Q. Suppose we have the Kelley apparatus erected in the hall, and that we had the steam pipes T T T along the ceiling of this apartment. Owing to the numerous openings the cold air is permitted to come into this apartment. How would you get the air equally distributed throughout the various parts of the apartment?

207 A. Supposing that you use the Kelley apparatus?

Q. Supposing the cold air to have been passed in direct contact with the ice-box, half the height of this apartment, or, as we will assume, and as the case with the refrigerator, the entire height

of the apartment, now, that air when introduced is very much heavier than the contained air, is it not?

A. It is a little heavier than the contained air.

Q. Would not that cold, heavy air find its level in the apartment, even though the windows and doors might be open, just as much so as if you were to pour water through those holes?

A. No; not as though it were water. If I understand your problem, the ice-box is in the hall outside of the room with no opening communicating?

Q. With no opening back of the ice-box but the opening of the window.

A. Then the path of the air would be from the place where it was let in more or less towards the window or wherever the opening was.

Q. To the extent that any draft might be created, owing to the opening?

A. To the extent that a draft would be created, because the air had to go out that way.

Q. Suppose the idea were to change the temperature of this room, and suppose the only means of exit for the air was through holes bored in the floor or openings in the bottom of the floor, then
208 clearly you would get an equable distribution in every sense, would you not?

A. You could, under those circumstances, with such an arrangement, I think, get an equable distribution of the air through the room.

Q. You do know and have had brought to your attention in connection with this patent of refrigerating apparatus consisting of ice-box, fan, and conduits for the introduction of cold air, and then a series of openings in the floor or right at the floor for causing the warm air to go back to the fan again?

A. I have, as infringements of the Kelly patent. My attention has been drawn to several such.

Q. Then it is not an unreasonable assumption to assume openings in the floor to permit the cold air to come in, without reference to where it goes out after it gets into the apartment?

A. Such an arrangement undoubtedly could be made.

Q. And yet you say that, in your opinion, notwithstanding the fact that you would get an equable distribution of the air (and that, too, of cold air), this apparatus so used would not be within your understanding of the Kelley patent?

A. It would be, as I have said before, the Kelley patent used in a different way from that which is indicated in that patent.

Q. And it is the use namely [mainly] which you consider to be the novel feature, if I understand you correctly?

—. No; not at all. I consider that that is an essential feat-
209 ure to a successful operation of the thing, to make it worth while doing.

Q. That is one of the limitations and boundaries of this patent, as you understand it?

A. I am not prepared to say that. What I mean is that it is

essential to the successful operation of this thing economically and efficiently, but as to the construction in that sense of the patent I am not prepared to say.

Q. But you are quite certain that such an apparatus would not be the Kelley apparatus, used as Kelley intended it to be used and as you are instructed by his patent to use it?

A. No; I should not so understand it.

Q. Suppose that, instead of this room, the same arrangement was in a car loaded with meat, would that in any way make it any more within the Kelley patent, in your opinion?

A. As I understand the apparatus to which you allude, it is one precisely like the Kelley apparatus, except that it takes the air from the outside and delivers the air to the outside again.

Mr. CONKLING: Delivers the air to the outside again and lets it find its way out? (Continued.) I should not think that was the Kelley apparatus as indicated by Kelley.

Q. Suppose that you were to take the Kelley apparatus and place it in a closed apartment, letting it operate as you understand it to operate, with the single exception that there is a ventilator at the top of the car. As I understand you, under such circumstances it would be a useless use of the apparatus, because you would
210 get no beneficial result, such as the preserving of carcasses?

A. No, if I understand your question rightly. Let me hear the question again.

Q. I will put it anew. Would the Kelley apparatus, in your opinion, preserve the carcasses, where it was used, so as not to use the same air over and over?

A. I do not think it could be relied upon for that purpose, though by an extravagant use of ice it might be made to work.

Q. Would it be made to work as a refrigerating apparatus or as a cooling apparatus, bearing in mind the distinction which you drew between those two terms?

A. As it would produce some cooling effect it would operate as a cooling apparatus.

Q. There is no advantage or, rather, there is no necessity for refrigerating grain, is there?

A. The object of perfectly preserving it would be to cool it to somewhere near the temperature of ice, so as to destroy mould or germs.

Q. But you would not freeze grain, would you?

A. You could not very well freeze it if it was dry.

Q. Is not the only thing necessary in order to preserve grain that you should permit the air thrown off by the grain to escape, so that it shall not be held in contact with the grain continuously, or, more exactly speaking, have the heat thrown off?

A. No; there are two ways of preserving grain. One way is to dry the grain—that is to carry off the moisture or hot vapor
211 from it by drying it. That preserves it by drying. If you want to preserve it by cold, then you must cool it considerably.

Q. Suppose that you had the Kelley apparatus in the very compartment in which the grain was located—you having stated that you believed that it was intended to be used in the apartment itself—and that you had that apartment loaded with grain, how would it operate; how, in other words, would it be possible to operate it?

A. I have never seen this apparatus placed in a grain bin, and am at a loss to know how it was intended to work it in a grain bin.

Q. You admit that there would be great difficulty in applying it in the apartment itself, so as to use the same air over and over?

A. The difficulties would not be due to that. They would be equally great, if not greater, to apply it in any other way. The difficulty is to see how you are going to cool the grain by passing ice-cold air into it.

Q. In any manner in which you might apply and use this Kelley apparatus in a grain bin, would it not be an air cooling and distributing apparatus in contradistinction to a refrigerating apparatus?

A. Not of necessity. It could be used as a refrigerating apparatus with the idea of passing in the air so cold that air would destroy or hold in suspense the vitality of all the germs and so prevent fermentation.

212 Q. Would not that same result be accomplished by forcing the cold air in, so as to displace the contained warm air and permit it to escape into the atmosphere?

A. If it could be done.

Q. Could not such an application and such a use of this apparatus be attained with far less trouble than to so arrange it as to use the air over and over again, where you had the grain itself in the apartment?

A. No; I cannot see that it would make any difference.

Q. What do you understand by the grain bin?

A. I understand an enclosure full of grain.

Q. With a lid that lifts up, usually?

A. These bins reach up through several stories of the building, and I do not know whether they have any lids at the top or not.

Q. You do not understand a grain bin to be a thing which runs up through several stories of a building?

A. That is my understanding.

Q. I suppose you mean a grain elevator?

A. An elevator is another thing; that is what raises the grain into the bins. Those great buildings across the river are grain bins. An elevator pumps the grain up into them.

Q. But every ordinary grain bin of small size is a thing which has a cover which you can lift off. You are speaking of that

213 thing of some dimensions, which is a mere receptacle into which grain is poured?

A. It is a receptacle for containing grain.

Q. Have you ever seen a grain bin that was entirely air-tight, so as to exclude the outside air?

A. As tight as things are generally built. I never saw a room that was absolutely air-tight.

Q. Is it not the fact that in these grain warehouses, where they store grain, that in every one of them, in order to preserve the grain, it is absolutely necessary to have some ventilating means?

A. I see that they all have windows and the windows are occasionally open.

Q. Is there not other ventilating means, and is it not absolutely necessary that there should be?

A. I do not know about that. I am not familiar with it.

Q. Do you not know that if you were to put grain, as an illustration, corn, after it was shelled in the fall, in large quantities into large bins and entirely exclude the external air, so as not to allow the heated germs to escape, that the grain would be spoiled in a short time?

A. I have no doubt, if it were shut up tight so that it could not dry, that it would spoil.

Q. Must it not be so open that the heat and the impurities, the germs, etc., that are there may be enabled to escape and go entirely out of the apartment containing the grain?

A. Undoubtedly, if no other means are used there must be
214 natural ventilation enough to keep the grain in good order.

Q. All that would be necessary to make the Kelley apparatus perform the operation of air cooling and distributing apparatus for reducing the temperature of the grain bin would be to run the pipes T T T into the apparatus, would it not?

A. That would be one way of doing it.

Q. Leaving the balance of the apparatus outside?

A. That would be one way of doing it, and you could get some effect.

Q. Would you not get a very great effect?

A. Only at very great cost, as I have said. With a great deal of ice you could do a little cooling, but it would be a very foolish way of doing it.

Q. In what other way could you possibly do it if, as you say, there are difficulties which make it, so far as you know, probably impossible to so apply this to a grain bin as to use the air over and over?

A. I have not said there would be any difficulties in so applying it to a grain bin as to use the air over and over again. On the contrary, I say that that would be the right way of doing it, but you might do it without using the air over and over again and get some effect, but much less than you would get if you did as I understand that Kelley intended.

Q. Suppose that we have a large grain bin entirely filled with grain, and that the Kelley apparatus is at the end of the bin—the apartment is filled with grain—do you suppose that under such circumstances the Kelly apparatus would operate?

215 A. Do you mean if it is put in inside of the grain?

Q. I mean put at one end of the apartment in which the grain is placed, precisely as you have said you understood that this apparatus was to be used in cooling an apartment?

A. It cannot be in the bin, anyhow, nor can it pass the air into the bin, as I understand it, under any circumstances.

The COURT: How, unless you had a draft through, can you get any circulation of the air?

Mr. BENNETT: You could not get it. That is the point that I want the Doctor to admit. What you could do, however, would be to introduce cold air, and, to the extent that cold air was introduced, you would displace the warm air.

The WITNESS: Among the grain?

Mr. BENNETT: No; at the top of the grain. This heat would rise.

The WITNESS: No; it would stay in the centre of the grain. You might have ice on top, but the grain would burn up all the same.

Q. Tell me how it is that in all these grain bins where large quantities of grain, many thousands of bushels, are put together that it is preserved.

A. Simply by the cooling that takes place through the walls of the bin; that and the escape of moisture from the top, where it goes out.

Q. Then there must be an escape for the moisture and the heat?

A. That helps. It is not necessary always.

Q. In stating your understanding that this apparatus is to be used in a certain way, did you take into consideration the
216 fact that the proper reading of this patent would be: An improvement in air cooling and distributing apparatus for cooling places and apartments in which it may be desired to reduce the temperature of the atmosphere by the introduction of cool or cold air?

A. Yes. I considered that as a general sweeping-up statement on the part of the patentee—to take in all that he could get.

Q. But he forgot to state anything about a closed apartment or about the air being used over and over again?

A. That was manifest from the state of the art and from the drawing.

Q. Manifest from the drawings? Do you see any apartment shown in the drawings?

A. No; but——.

Q. If you were to take the apparatus as shown in the drawings——

A. It would not stand by itself. It implies a room and an enclosure to support it. There are the beams which are for the support of the roof, and those beams would not float in the air.

Q. Would you not have those beams in a slaughter-house, where the external air was not excluded?

A. You might have put them in the part where the animals were killed.

Q. So you would have some arrangement of beams and some means of support, etc., whether you put that apparatus in an enclosed apartment or put it in an apartment which was not closed?

217 A. Yes; so far as that goes. It is manifest that it is for an apartment, open or closed. Now, the question is, What apartment? That — is a closed apartment only that is to be used is derived from common sense and from a knowledge of the art.

Q. You say from common sense. I do not know what that may mean, but it would be common sense, I suppose, to take this apparatus and use it for ventilating and cooling hospitals, would it not?

A. I think not; unless you wanted to kill all the patients.

Q. Why?

A. Because if you had an ice-box to stream down ice-cold air all over the room I think that you would finish your patients pretty quickly.

Q. Then you consider these perforations, so as to permit the cold air to be drawn right down in contact with the article to be preserved, an essential feature of the fifth claim, do you?

A. So thrown down that it gets on the articles under it.

Q. By what means does it get on the articles?

A. By flowing over them; not by spurting right at the article.

Q. Is it not the fact that the way in which that comes in contact with the carcasses, if not by being thrown directly down, is by the whole volume going straight to the bottom—finding its lowest level—and then spreading out over the apartment where it is not obstructed and rising, thereby crowding out the warm air?

218 A. It depends upon the shape of the apartment and the position of the orifices. It may go sideways or obliquely or downward—by all sorts of directions.

Q. Suppose that we were to take this Kelly apparatus, considering (as you seem to consider them) these perforations of no importance only so that there are openings to permit the cold air to get out, would not this be an apparatus that would then perform a valuable purpose in ventilating a hospital or a public hall?

A. Not when constructed and arranged as here shown—that is to say, you do not want to ventilate a hall with ice-cold air nor a hospital either.

Q. Have you never known of a building being ventilated by the use of air passing over and in contact with ice?

A. I have known of a building—a theatre—said to have been so ventilated for a while by letting the air in through the registers that were otherwise used for heated air and throwing the cold air in from below, but it was only used for a little time and did not seem to succeed. It was tried in Philadelphia many years ago.

Q. Omitting from the combination these perforations, which would be very valuable, I suppose, when you had carcasses in a building, this apparatus would do just exactly as Kelley states—that is, it would change the temperature of halls and other places in which you desired to reduce the temperature?

A. It might be used to produce a lowering of the temperature, irrespective of what results might follow.

219 Q. Is not the same beneficial result accomplished by projecting a current of cold air directly down to and in contact

with the carcasses of meat as if it issued from openings in the Kelley apparatus?

A. There is no special benefit if it were projected so as to strike directly upon the carcasses. What you want is rather to establish a uniform and gradual movement of the air all over the apartment, so that there shall be no point at rest, and not to throw special jets.

Q. Is not that accomplished by a fall of colder air crowding out the warmer air?

A. No; I do not think that the question of heat and cold has anything to do with it in that regard.

Q. Suppose that we take the defendant's apparatus and hang the carcasses back of the openings and not in front of the openings, how then does the cold air come in contact with the carcasses?

A. If the carcasses are hung at the very extreme end, beyond the pipe?

Q. Hung beyond any of these openings?

A. The air being let into the chamber full of carcasses it cannot go far before it strikes one, which produces eddies in the air and the air is broken up and thrown every which way—generally stirred up.

Q. Is it not the fact that as that air is admitted at that opening its tendency is to drop right down?

A. Only to a limited degree. If there was nothing in that
220 chamber at all and that air had some smoke in it you would find that it went a little way down, but if there was a strong draft there then it would curve up to the opening, making a mark straight through.

Q. Then you would get some benefit in this respect: That, first, the air as it issues from the perforations would come in direct contact with the carcasses and flow around them?

A. Yes.

Q. And then it would seek its level, its lowest level, crowding out so much air, and in its turn being crowded out?

A. I would not say that it would seek its level. It would get very quickly stirred up with the rest of the air and scattered.

Q. Kelley does in his patent state that this peculiar construction of perforations is understood to secure all the results accomplished by such arrangement.

A. He speaks of so distributing the air as to bring it in direct contact with all the objects to be cooled.

Q. Does he describe any other mode of operation except that?

A. No; he means always that the air, as introduced, should be thrown over all the carcasses and not thrown in some directions and not in others.

Q. Does he not also state in that patent that these pipes T T T must be so located as to come directly over the carcasses to be cooled?

A. He says that the pipes must be located immediately over the various rows of carcasses.

221 Q. That is, over each row of carcasses?

A. Yes; each row of carcasses should have a pipe over it.

Q. And does he not further state that there must be smaller open-

ings from which currents of air may issue and descend or be driven upon each carcass or part of one?

A. Yes; he prefers that as being the most perfect form of distributing the air.

Q. Your assumption is that he prefers that?

A. Yes; because he specifically mentions it in that way.

Q. But does he not mention anything else?

A. No.

Q. So that in following out Kelly's description you must have these pipes *t t t* so arranged as to be over each row of carcasses, and you must have perforations so that a current of air shall be shed directly down in contact with each and every carcass and part of carcass in that apartment?

A. That is so if you want to get everything perfected in accordance with this description.

Q. Would not that be equally true whether you let the air after it came in contact with those carcasses escape out or whether you returned it to the fan?

A. So far as that part is concerned it would not make any difference.

Q. Do you suppose that the use of the Kelley apparatus in an apartment where the air was allowed to escape and using fresh air, introducing it in a cold condition and permitting it then to escape, could be used for the successful preservation of meat, say, for a period of five, six, or seven days?

222 A. I think that if expense were no object it could be done.

Q. In the Kelley apparatus what is the lowest temperature that is possible to be obtained?

A. Something a little above the melting point of ice—32 degrees Fahrenheit.

Q. Would it be fair to say that the average would be above 34 or 35 degrees?

A. I think that would probably be it.

Q. It is necessary, as I understand it, in order to preserve the meat that you preserve a temperature at about that point, is it not?

A. No; you can go a good deal above that. The point of vital necessity is that you shall not go below it. If you freeze the things you spoil them.

Q. At what temperature will meat freeze?

A. Anything below 32 degrees.

Q. You are quite positive of that, are you?

A. That is my belief.

Q. Have you ever tried that?

A. I have never tried the experiment myself.

223 HENRY MORTON recalled.

Cross-examination resumed.

By Mr. BENNETT:

Q. Dr. Morton, I believe you stated yesterday that you had testi-

fied as an expert in reference to this patent in the case against Toffey, in the district of New Jersey?

A. I believe I did.

Q. In that Toffey apparatus there was an ice-box, was there not?

A. I cannot now recall it.

Q. Have you before you a copy of your testimony in that case?

A. Not that I know of. The only one that I have here is The Bate Refrigerating Company against Joseph Eastman, in the United States circuit court, southern district of New York.

Q. I will hand you a copy of your deposition in that case, or one of them, and desire you to examine it so that you can say whether or not in that Toffey apparatus an ice-box was used (handing witness a pamphlet, and also a drawing).

A. I find that, as stated in my testimony referred to, this Toffey apparatus was a combination of a fan-blower, ice-box, and conduit or conduits to secure an equable distribution of air in an enclosed space.

Q. Then in that Toffey apparatus there was an ice-box, a fan, and one or more conduits?

A. Yes, sir.

Q. And is it not also true that it was so arranged as to circulate the same air over and over?

A. It is.

Q. Do you remember how many openings there were in
224 the Toffey box permitting the cold air to enter the chamber?

Mr. DICKERSON, Jr.: I would suggest that we are wasting time about that, as all that record is before your honor by stipulations, showing the exact number of openings.

Mr. BENNETT: So much as you desire to read or make part of this case you have a right to do, but I desire now to question the witness in reference to the testimony he gave in that case, in order to have it appear to the court what apparatus was involved in that case.

Mr. DICKERSON, Jr.: That is what I think; I am not formally objecting. If you want to test the witness' memory, that is one thing; but he is not here on a question of memory. Why not show him the apparatus and examine him about that?

Mr. BENNETT: He has had the drawing before him.

The WITNESS: I glanced at the drawing; I did not take time with it.

Mr. BENNETT: Look at the drawing, please (handing witness a drawing).

The WITNESS: That is the only drawing, is it?

Mr. BENNETT: No; there are two or three. I am referring to this one especially.

The WITNESS: I think in each case in each of these boxes there were three openings in the ceiling and one long opening in the floor by which the communication was made between the lower part of the ice-box and the lower part of the room.

225 Q. In that Toffey apparatus was not the cold air introduced

at the bottom of the chill-room and the warm air taken out at the top of the chill-room through these openings?

A. It was.

Q. In one of those Toffey apparatuses that was before you at the time you testified in that case was there not but a single opening from which the warm air was permitted to pass out from the chill-room and come in contact with the ice?

A. Not according to my recollection.

Q. In that case you testified as follows: "I do not consider that the direction which the air moves in the chill-room is of any consequence whatever." Do you still adhere to that opinion?

A. I do substantially—that is, under the conditions there contemplated.

Q. So that it makes no difference, in your opinion, whether the cold air — to be introduced at the bottom of the compartment or introduced in the top of the compartment?

A. Not when the rest of the conditions are such as to secure complete circulation.

Q. Bearing in mind that your recollection of the Toffey apparatus is that there was an outlet from the ice-box so as to permit the cold air to be introduced into the compartment near the floor, and that there were three openings from which to take in the warm air at the far end or opposite end of the room, I desire you to inform the court whether, with that apparatus before you, you did not testify
226 in that case that you found only an infringement of the first three claims of the Kelley reissue.

Mr. DICKERSON, Jr.: I do not think that the question is competent, the question of the infringement of these claims being a question of law for the court, and the court, as matter of fact, finding an infringement of the fifth claim by those apparatuses, in the decision.

Mr. BENNETT: While Mr. Morton is examining the record I desire to call your attention to a question that arose yesterday in reference to the punctuation of the statement of invention in the Kelley patent. There would seem to be some little confusion as to the punctuation between the word "establishment" and "cooling halls." I wrote to the Patent Office last night, and I have just now received a telegram to this effect: "Semi-colon in both file and record." I will have a verified copy by the fore part of the week. That shows that the correct punctuation between the word "establishment" and "cooling halls" should be a semi-colon.

Mr. DICKERSON, Jr.: It is a curious illustration of the carelessness of the Patent Office, because we have three certified copies in which it is a comma.

227 The stenographer reads the last question to the witness as follows:

Q. Bearing in mind that your recollection of the Toffey apparatus is that there was an outlet from the ice-box so as to permit the cold air to be introduced into the compartment near the floor, and that there were three openings from which to take in the warm air

at the far end or opposite end of the room, I desire you to inform the court whether, with that apparatus before you, you did not testify in that case that you found only an infringement of the first three claims of the Kelley reissue.

A. I did not. What I did testify was that I did find an infringement of those three claims, but as no question was asked me as to any other claim, of course I gave no testimony in reference thereto.

Q. Have you examined your testimony given on that occasion to ascertain whether a direct question was asked you or whether you were asked to compare the apparatuses and state wherein it infringed, in your opinion?

A. The question asked me was, as I have just stated, whether the apparatus infringed the first, second, and third claims. That is the last question of all; that is the end of the examination.

Q. And you made this answer on that occasion, on page 48: "I have carefully examined the various exhibits enumerated in your question, and do not find in any of them, except in the
228 original Kelly patent, the invention described in the first, second, and third claims of the Kelley reissue, No. 7643."

A. That is correct.

Q. Have you examined your testimony farther to ascertain whether, throughout the entire case in which, I believe, you were examined on no less than two or three different occasions, you made any statement as to finding contained in the Toffey apparatus the fifth claim of the Kelley reissue?

A. I have not examined my testimony with any such view.

Q. Is it not an important factor in an apparatus constructed upon the Kelley plan that there should be a very rapid circulation of air in order to secure a good result—that is, a temperature something near the freezing point?

A. That would depend. When fresh meat was placed in the apparatus the circulation should be pretty rapid to reduce the temperature. When the temperature was once reduced it might go on quite slowly and yet maintain the low temperature which was desired.

Q. That is, it should have a capacity for a very rapid circulation?

Mr. DICKERSON, Jr.: I do not think the question would aid the court at all unless we know what very rapid circulation is; but I shall not object.

A. It would depend upon various conditions. The rapidity of the circulation in a certain arrangement of pipes and tubes would have a good deal to do with its completeness, and in another
229 arrangement the circulation would be more thorough if it went on more slowly.

Q. I believe you stated you have examined refrigerators on shipboard containing this ice-box, fan, and conduits?

A. No.

Q. You never have?

A. I have never examined those on shipboard.

Q. Have you ever examined them anywhere?

A. Oh, yes; I have seen them in ice-houses—cooling-houses.

Q. Tell me where you have seen in operation a Kelley apparatus.

A. One place was in the upper part of the city of New York; it was a great many years ago; I don't remember just where; it was on one of the avenues uptown.

Q. Did the apparatus have a series of distributing pipes?

A. It had several.

Q. How were the openings of those pipes?

A. They were near the ceiling. I cannot remember exactly their arrangement, but at the time I looked at them with a view of seeing whether they fulfilled what I then understood to be the conditions of Kelley's patent to be sufficiently numerous to secure circulation throughout every part of the room, and they did so.

Q. Were there any perforations on the under side of the distributing pipes?

A. I remember the apertures of the pipes were on the under side. They were square wooden troughs, as it were, with openings at several points along.

Q. But there was no system of distributing pipes apart
230 from the main trunk that was perforated?

A. I think there was a main trunk on one side and a branch across the room.

Q. And there were openings in that?

A. Yes, sir; openings in both.

Q. Have you ever seen in operation on any occasion anywhere an apparatus constructed as shown in the drawing of the Kelley patent?

A. None constructed precisely in detail like that.

Q. In the Toffey apparatus was not the ice-box, fan, and the conduits in the apartment to be cooled?

A. As I recollect, they were.

Q. I believe you stated at our adjournment yesterday that it was not possible to get the temperature in a refrigerator using an ice-box below, say, about thirty-three, a fair average being about thirty-five?

A. That is my opinion.

Q. And also that meat would freeze if it was below thirty-two?

A. That is also my impression.

Q. Do you know at what temperature the defendant transports his meat to Europe?

A. I do not.

Q. Have you ever been informed as to the average temperature maintained in those boxes of the defendant?

A. I have not.

Q. Would it in any way shake your opinion if it should prove to be a fact that the defendant maintained an average temperature of about twenty-eight, and lands his meat at Liverpool without being frozen in any part?

231 A. Yes, sir; it would modify my idea as to the point at which meat froze. I have never informed myself on that at all.

Q. Tell me what is the lowest degree of temperature that it is possible to maintain in a refrigerating apparatus constructed as the defendant's is.

A. That would be simply a question of the relative size of the parts of the apparatus and the rate at which the machinery was run and the adjustment, but undoubtedly an extremely low temperature could be maintained if it was desired to do so.

Q. Have you ever read or had brought to your attention any of the scientific discussions that have taken place in Scotland and England in reference to this Bell-Coleman apparatus?

A. I have not.

Q. Do you think it is possible to operate that apparatus before you and as there arranged to a temperature as low as one hundred and sixty below zero? I am speaking of the defendant's apparatus.

Mr. DICKERSON, Jr.: I wish the counsel could state whether he is referring to an apparatus the size of the model or to practical apparatuses.

Q. Do you think it is possible with one of the Bell-Coleman apparatuses to obtain and maintain a temperature as low as one hundred and sixty below zero?

A. In the entire chill-room?

Q. Yes.

A. It might be. It would be extraordinary—a remarkable thing.

Q. Suppose it should be proved to be a fact that that ap-
232 paratus is capable of reducing it to almost any degree and maintaining it there, would not that of itself satisfy you that there must be some difference in the principle and mode of operation of the defendant's apparatus and the Kelley apparatus?

A. Not when used for cooling air.

Q. The mode of operation, I understand you, would be the same?

A. Substantially, as an air-cooler—when used to cool air.

Q. You get the same result?

A. You get the same result.

Q. But you get it in an entirely different way?

A. Yes; you get it by a mechanical process.

Mr. BENNETT: In this connection I desire that the court may understand this Toffey apparatus (showing model to the court and explaining the same.)

233 By Mr. BENNETT:

Q. Referring again to the Kelley patent, have you noticed in the specification the statement as to how the ice-box is to be managed—that is, as to whether there is to be any difference in the ice-box or the amount of ice which it is necessary to contain for the different uses to which this apparatus was to be applied?

A. I notice that where the greatest economy is desired a form of

ice-chest is used in which the melted ice or water running from the ice is used to impart some cold to the entering air passing through a coil of pipes.

234 Q. Do you not find a statement to the effect that the depth may be varied so as to contain an amount of ice necessary for the work to be done, indicating that the quantity of ice to be used is to vary according to the purpose for which the apparatus is to be used?

A. I do not notice that. Can you point out to me what you refer to?

Q. (Reading:) "With a depth such as to contain an amount of ice necessary for the work to be done." Whether that does not imply a variation in the amount of ice to be used for the different purposes for which this apparatus is to be applied.

A. Yes, sir; in this sense: that it means when you are cooling a large space you want a large ice-box, and a small space a small apparatus.

Q. Then by that statement it is evident that he did contemplate a variation in the size of his ice-box?

A. In his entire apparatus, the ice-box included.

Q. If you were going to cool the temperature of rooms, etc., you would not require so much ice as you would if you were going to refrigerate carcasses, would you?

A. You would not use up as much ice.

Q. You would not require as much ice in the ice-box?

A. The ice-box ought always to be full, or otherwise you would not draw the air evenly through it.

Mr. CONKLING: He is speaking of the size of the ice-box.

The WITNESS: You might use a small apparatus where you did not care to cool the room thoroughly.

235 Q. You have stated that that implied that there was to be a variation in the size of the ice-box under certain circumstances?

A. Yes, sir.

Q. Suppose you were using this apparatus for the ventilation of a building, you would not require then so much ice, and consequently not so large an ice-box as you would where you intended to use it for the preservation of carcasses, would you?

A. If you wanted to use it to ventilate a building you would have to use a little more ice, because for the ventilation of a building you would have to take the fresh air, and to produce any sensible effect you would have to use tons of ice.

Q. Suppose this — be an air cooling and distributing apparatus, and that it was to be used for cooling air in places and apartments where it was desired to reduce the temperature——

Mr. CONKLING: Cooling cellars, for example.

Q. (Continued.) Would it not be of value to pass the pure air taken in from the outside over a small body of ice before introducing it into the apartment to be cooled?

A. It would have some effect.

Q. It would purify and dry the air to a certain extent, would it not?

A. To a certain extent—yes, sir.

Q. And therefore you would be injecting into the apartment air of a much better character and kind than that which was already contained in the apartment?

A. Theoretically, but practically wherever I have seen them tried it don't seem to produce any effect.

Q. Kelley, after having described his two forms of ice-box,
236 refers to the use of an ice-house, does he not, as a substitute for an ice-box?

A. Yes, sir.

Q. Do you not find, in that connection, a very exact statement as to how the ice-house is to be arranged when it is used as a substitute for an ice-box?

A. Nothing very exact, but a suggestion that an ice-house should be enclosed.

Q. Does he say that there must be a tight covering made over all or a portion of the ice in such ice-house?

A. He does.

Q. That conveys to your mind, does it not, the fact that the ice-house itself must be enclosed from the outside air?

A. It would be enclosed anyhow. An ice-house is always closed.

Q. But does that not imply more: That when you desire to use an ice-house you must have a tight covering over the ice, so as to exclude the outside air and confine the air brought in contact with the ice so as to bring it into intimate relations with the ice?

A. Not with that view. When you have an ice-house you don't want to spoil the ice-house for other uses, so you cover as much of it as is necessary, as the patentee says, so that from the covered portion you can get a circulation of cold air without being prevented from using your ice-house for other purposes at the same time.

Q. Doesn't he say that there is a special advantage in making a tight covering and placing a tight covering over that portion of the ice or ice-house which he desires to use?

237 A. He suggests, I think, that he is not going to draw the air down through the whole mass of ice in the ice-house, but only to draw it over the surface of the ice, and therefore he needs to confine it laterally.

Q. The object of that confining, then, is so that the air may be brought in contact with the surface of the ice?

A. And thoroughly cooled.

Q. Does not he distinctly state in the patent that he has another object, which is so that the air, being admitted on one side, is being sufficiently cooled by being brought in contact with the ice before it passes out at the other side of the room?

A. The use of the word "side" has no particular significance there. It means one part, so that it shall travel over a sufficient space. If it was from top to bottom it would be the same.

Q. As you understand it, the use of the words "admitted on one side" imply no limitation?

A. No limitation to one side; as, for instance, if at one corner in a given side wall the air was let in and at another corner of the same side wall it was taken out, that would fulfill the conditions.

Q. Does it not mean, as there stated, that it is to be on the side opposite the side where the air is introduced into the apartment to be cooled?

A. No; I don't think so.

Q. Does he not distinctly state that, being admitted on one side, it is sufficiently cooled, by being brought in contact with
238 the ice, before it passes out at the other side?

A. Yes.

Q. Now, that implies two sides, doesn't it?

A. In a sense, but not in such special sense that there must be two sides, that it must be a north side and a south side and not two corners on the north side, or any such thing as that.

Q. It does state that the air to be brought in contact with the ice in the ice-house is to be taken in at one side, and that it is to be let out at the other side, doesn't it?

A. But any one reading that and using common sense would realize that that was being fully complied with if the air was let in at one point in one side and carried across in a box to the other side and brought back again and taken out right alongside the very point at which it was brought in. That, notwithstanding this arrangement, would fulfill the conditions which are here indicated, which are to get it to travel over the surface of the ice.

Q. Leaving out of consideration the common-sense view of it and confining yourself to the language which the patentee uses, is it not a fact that the language does state and clearly conveys and conveys only the idea that the air is to be taken in at one side of the ice-house and be let out at the other, meaning the two opposite sides of the ice-house?

A. Those words are used, but they do not to an intelligent mind convey any such limited meaning.

Q. You stated, I think, a moment ago, that the object of confining the ice was in order to crowd the air down so as to bring it in contact with the surface of the ice?

239 A. That is one of the objects, undoubtedly.

Q. In such a case as that you would only get the benefit from the surface of the ice and not from all the ice contained in the ice-house?

A. That is true.

Q. If you had an ice-box such as Kelly shows there in his patent the air would traverse through the entire body of the ice, would it not?

A. No; it would travel over the surface of all the lumps of ice.

Q. But it would come in contact with the entire body of ice contained in the apartment?

A. It would come in contact with the surfaces of all the blocks of ice contained in the apartment.

Q. While in the ice-house it would only come in contact with——

A. The surface blocks.

Q. The top layer?

A. Yes, sir.

Q. The air was to be sufficiently cooled in passing it from one end of the ice-house to the opposite end, if this statement of Kelley's be correct?

A. Yes.

Q. Do you find anything contained in the patent, any statement that any other part of this apparatus is to be confined except the ice?

A. I find no direct statement to such an effect.

Q. You admit, I suppose, that the patentee was very particular indeed to state how the ice-house was to be arranged and the ice-boxes, do you not?

240 A. He has not been very particular, but he has given sufficient indication as to what he wanted to get and what arrangement would accomplish that result.

Q. After he has stated that the air is brought in at one end of the ice-house, permitted to pass over and come in contact with the exposed surfaces of the ice, and let out at the opposite end, does he make any statement whatever in that connection of what is to become of the cooled air after it has been once introduced into the apartment?

A. He does not make any statement as to what is to become of it after it gets out of the ice-box, even.

Q. He does not?

A. No.

Q. Does he not distinctly state that it is to pass out at the other side into the pipe P, as at *e*, referring to Fig. 1, we will say, where P and *e* are shown?

A. Yes; I was wrong. He says it is to pass into the pipe P.

Q. Then the inventor took great care to instruct us how the air was to be brought in and where it was to be let in, how it was to pass over the ice, and what was to become of it after it passed over the ice, but does not tell us, as I understand you, what is to be done with the air after it has so passed out into the apartment to be cooled?

A. That is true.

Q. Farther on in the patent do you not also find a statement as to precisely how the air is to be taken into the apartment to be cooled?

241 A. I presume the passage to which you allude is that beginning, "Now, the ice being arranged."

Q. You may state whether that passage does not distinctly inform you that the air is to be taken into the ice-box and what is to become of it after it has passed out of the ice-box.

A. Taken in connection with the drawing, it shows that the air is to go into the ice-box through the opening *a a*.

Q. After it is taken into that ice-box what does that statement say is done with the air? What becomes of it?

A. It makes no statement about what becomes of it until it has been cooled by the ice and forced by the fanner into the pipe P, from which it is to be delivered into the apartments.

Q. The exact language being, "into places or apartments to be cooled," is it not?

A. Yes, sir.

Q. And it is to be distributed through a sufficient number of small, perforated tubes, is it not?

A. Yes, sir.

Q. Do you find in that connection or immediately following any statement of what is to become of the air after it has been distributed through a sufficient number of small, perforated tubes?

A. No; there is no specific statement in reference to what is to happen to it after that.

Q. None of the application of it, then, to be made beginning with the words "to properly equalize the air thus introduced or
242 distributed to the carcasses hanging in the slaughtering-house?"

A. Oh, yes; that I did not understand was referred to in that question—that is, covered by the distribution. The air is introduced into the apartment and thoroughly distributed there.

Q. That is what is to become of it, isn't it? It is to go through and be distributed in that way?

A. It is to be distributed upon the carcasses to be cooled.

Q. Does not the patent state in that connection that that distribution of air in direct contact with the carcasses is through the system of pipes represented in figures 1 and 5 of the drawing?

A. It does.

Q. Now figures 1 and 5 of the drawing show that peculiar system of pipes *t t*, do they not—that is, containg perforations on the under side?

A. Yes, they do.

Q. And the special operation or function of those openings and that peculiar arrangement is fully described by Kelley, as I understand your view of the patent?

A. I think so.

Q. In the case before Judge Nixon you testified, as I understand it, as to the first, second and third claims and you stated—I will refer you to the testimony if you desire it—that this was an apparatus to be used in such a manner as to circulate the contained air over and over, did you not?

A. That is my understanding.

Q. I suppose you have noticed a great difference in the
243 wording of the first and fifth claims of this Kelley apparatus?

A. Certainly, the claims are very different.

Q. The first claim of the patent, in reference to which your attention was specially directed in the Toffey case, included a fan-blower

or its equivalent, in express language; also an ice-chest or equivalent and one or more conduits, did it not?

A. It did.

Q. Is not that the only place in this entire patent that you find any reference whatever to an equivalent or the use of that word?

A. Very likely it is so.

Q. Then that equivalent of the fan-blower and the equivalent of the ice-chest, etc., for the first time appears in the first claim of this patent in reference to which you testified in the Toffey case?

A. It may be so. Of course, I do not attach any importance to the use of the word "equivalent."

Q. In that first claim do you not find the exact statement "within the place or compartment to be cooled?"

A. I do.

Q. At the time you made a certain affidavit for use on a motion for injunction as against this defendant apparatus you had under consideration only the first and second claims, had you not?

A. I believe that is so.

Q. And in that affidavit you stated, "I therefore find in this apparatus," meaning the defendant's apparatus, "the apparatus described in the Kelly patent and claimed in the first and second claims thereof, namely, an air cooler or apparatus for cooling carcasses, consisting of the combination of a fan-blower
244 or its equivalent—the equivalent of a fan-blower being the air-pump by which the air is put in motion; an ice-chest or equivalent—the equivalent for an ice-chest being the apparatus for cooling the air and removing its moisture, consisting of a tank and condensing coil, together with the air-pump and one or more pipes or conduits, which equably distribute the air within said apartment to be cooled—the equivalent of the pipes or conduits being the numerous pipes by which the compressed air is distributed through the chill-room."

A. No doubt that is what I testified to.

Q. So that it appears that in connection with the first claim of this patent at that time you did take into consideration the express statement that an ice-box or equivalent, a fan or its equivalent, etc., was stated in the claim, did you not?

A. The presence of the word "equivalent" had no influence upon my judgment at that time.

Q. But you found it in the claim and took it into consideration, did you not?

A. It was there, but it had no influence upon my conclusion.

Q. You find no such wording in the fifth claim, do you, as to the ice-box or its equivalent, etc.?

A. I don't find the word "equivalent." The ice-chest is mentioned.

Q. Is there in the fifth claim, taken apart from the specification, anything that would enable you to state that the apparatus
245 therein described is to be used in an enclosed apartment only so as to circulate the contents over and over?

A. If I took the fifth claim without the specification I should not know anything about it—should not know what it meant.

Q. You would not know anything about how to use it?

A. I should not be certain what apparatus it referred to. It might be a steam-engine or a horse-car.

Q. You don't mean that, Doctor—a steam-engine?

A. Not literally. I mean as a matter of illustration.

Q. Is there anything in that claim which assists you in arriving at the conclusion that this apparatus was intended to be used only in a closed apartment and to circulate the contents over and over?

A. If I knew nothing about the patent except this claim—in other words, had never read any other part of it—then I might understand from the statement that this was an apparatus for cooling carcasses that was to be used in a chill-room or ice-chamber; but if I had read the entire patent I would know this already.

Q. Suppose you were informed that an apparatus consisted of the combination of a fan and a system of tubes and an ice-chest or depository, would you not understand what apparatus was intended by that language?

A. I might understand fifty apparatuses to be intended by that language.

246 Q. Again I desire to ask you if there is any language in that claim that affects your mind in arriving at the conclusion that this apparatus covered by that claim is to be used only in an enclosed apartment; and if so, if you will quote that portion?

A. If by your question you mean that I am to consider that claim as entirely disassociated from the specifications, then I should say that the only part of that claim which indicates the use of the apparatus in a closed chamber are the words referring to its being an apparatus for cooling carcasses.

Q. Won't you read the words and let them go down on the record?

The WITNESS: "In an air cooler or apparatus for cooling carcasses."

Q. And so forth?

The WITNESS: And so forth.

Q. Do you not find in that patent some statements that go very far towards an opposite impression as to the use of this apparatus in only an enclosed chamber?

A. Well, like any other document, perhaps, that was ever written, one can get more than one idea from it if you try; but, taking the natural and plain meaning of that patent as it stands, to one having a general knowledge of the subject, it seems to me very clear that the patentee had in his mind and intended to describe an apparatus to be used in a closed chamber for the purpose of producing a great degree of cold there, and he may have thought that perhaps

247 it might be useful for something else and so have used a little ambiguous language in some part of it, but it is manifest his principal intention was what I have described, as shown by what he has here stated.

Q. I find that you testified in the case before Judge Nixon as follows: "It is quite true that certain portions of the description taken alone might convey an opposite impression—that is, an impression contrary to the use of this apparatus only in closed apartments."

A. Undoubtedly.

Q. Now, I would like you to quote from the specification all that part of the descriptive matter that might convey an opposite impression in your mind.

A. If taken alone?

Q. Yes.

A. I think that if we took by itself the passage which says "and other places and apartments in which it may be desired to reduce the temperature of the atmosphere by the introduction of cool or cold air, which I denominate an atmospheric cooler"—I think that taken alone might give one the impression that it was intended rather as a ventilating machine.

Q. Did you read there all the words beginning at "improvement in air cooling" or only some of them?

The stenographer reads the answer of the witness.

Q. You do not read what precedes that?

The WITNESS: I do not, because that gives the other impression.

Q. Do you find in the specification any other statements that would lead you to believe that it was to be used simply as an
248 air cooling and distributing apparatus? And, if so, quote that part.

The COURT: If the object of this testimony is to instruct me or to instruct the supreme court haven't you prolonged it enough in regard to the meaning of the patent?

Mr. BENNET: I think we have, sir. I desire to get from Dr. Morton, as he testified in the case before Judge Nixon, certain facts that will be very material when we come to make a motion at the conclusion of Dr. Morton's cross-examination, and without those facts appearing of record our motion could not be put in a proper form, certainly not with all the facts in the case before the court. I may say, however, that with this question, unless my associate, Mr. Conkling, has something more to ask about this Kelly patent, I am about through.

Mr. CONKLING: I would like to have you ask, or ask myself, one thing.

Mr. BENNETT: Wait until he gets through with this.

Mr. CONKLING: Yes, but it is one thing; it is about the answer that he has already given. I will suggest it to you when you get ready.

A. I think again that the use of the words "forced through the pipe P into any place or apartment to be cooled," if taken by themselves and without their context and the other descriptive parts of the patent, might imply in the same way that the object contemplated was ventilation rather than mere chilling.

Q. I would like to enquire as to these words: "Improvement in air cooling and distributing apparatus for cooling carcasses
249 where hung to cool in slaughtering establishments, cooling halls, railroad cars, grain bins, the holds of vessels, and other places and apartments in which it may be desired to reduce the temperature." Do you find in those words anything indicating that the chamber is to be closed so that the same air is to be used over and over again?

A. I think that those words, taken in connection with the drawing and a moderate knowledge of the state of the art in reference to these various uses suggested, especially that of cooling meat, would at once and naturally suggest that the apparatus was to be in a closed room and would be only valuable and efficient if so placed, substantially.

Q. That answer implies and carries with it, does it not, that the cooling of carcasses is to be the point?

A. That is one of the uses and perhaps the principal use.

Q. Now, if you please, read "cooling" as a verb before "halls;" you would not suppose that carcasses were to be cooled in public halls, would you?

A. No; if the word "halls" means a public hall.

Q. What do you understand "halls" there to mean—halls where carcasses are hung?

250 A. It might be a vault; it might be a place where things are kept, cold storing places, cold halls for storing.

Q. And, in that aspect, it would sustain the view that you have just stated?

A. Very strongly.

Q. If it meant halls in the ordinary sense, either the corridors of houses or public halls, such as we hear and read so much about, then it would stand in antagonism to that idea, would it not?

A. Not altogether, because we can suppose that this patentee knew the failures——

Q. I don't think you apprehend my question. It would stand in antagonism to the idea that carcasses were to be cooled there?

A. Certainly.

Q. And in that event it would clearly and conclusively denote the cooling of the atmosphere in those halls or places without any regard to the presence of carcasses?

A. Entirely so.

Q. Now, if you please, considering the words which I will now read to you, saying again that I read the word "cooling" as a verb and not as a part of a compound noun—"cooling halls"—would they, unless you suppose they mean a vault or such a place as you described, possibly convey the idea that they were to be hermetically sealed or otherwise guarded against the outer air, and that the atmosphere within them was to be turned over and over again?

A. I think it would suggest this: That the patentee, knowing how inefficient had proved the attempts to cool such
251 places where fresh air was brought in, had concluded that he would try an improved method by passing the air over

and over again by which a hall could be thoroughly cooled, for instance, before the audience assembled, after which there would be accidental ventilation enough to keep the hall in a reasonable condition, as it is on a cold day, when we have to keep the windows shut anyhow, and so maintain the temperature.

Q. That is, is it not, the best and therefore the most ingenious supposition that you can make to sustain that view?

Mr. DICKERSON, Jr.: That is not a proper question; I object to it.

Mr. CONKLING: I insist upon the question. It is inquired of the witness whether that is not the best and the most ingenious view that he, the witness, can suggest sustaining the idea that this meant that the air was to be used over and over again in a hall.

The COURT: I think the question is objectionable, because there is an implication that the witness has used his ingenuity.

Mr. CONKLING: And most properly. He should use his ingenuity.

252 The COURT: I think he may answer.

A. That supposition commends itself to my judgment at the present time beyond any other that I can at this moment think of.

Q. That is what I supposed you meant. Now, if you will indulge me a moment farther. "Cooling halls"—I still dwell upon those words; would it not be, in your judgment, an extreme supposition to think that an apparatus stated for that alone, if those words stood alone, "for cooling halls," meant what you have just described?

A. If those were the only words, taken entirely by themselves——

253 Q. Then it would be very extreme?

A. Then I don't think that would naturally suggest itself.

Q. And it would be an extreme supposition to suppose, would it?

A. I am not quite prepared to say that.

Q. If you do not think they would naturally suggest it, as you have just stated, would it not follow that it would be an extreme supposition? But that is rather a matter of casuistry. Let me waive it, please, for your convenience and mine. Now, I come to these words: "And other places and apartments in which it may be desired"—not to refrigerate or cool carcasses or grain or anything else, but "to reduce the temperature of the atmosphere." Take those words alone: "Other places in which it may be desired to reduce the temperature." Would those words indicate to your mind that this was to be done by fastening up the place so as to exclude the outer air and then agitate the enclosed air and use it over and over again?

A. I have already stated that those words would, in my opinion, suggest, not a closed room, but probably an open room.

Q. Then that brings me to this inquiry: When you read a patent or specification which says, in the alternative, that a certain thing is to be done or other things at large, do you construe that language by divesting it in any way or discarding in any way the alternative words?

A. No; but I try to take a meaning which will, as far as possible, fit all and be as little inconsistent as possible with any.

254 Q. That is quite right. So that I understand from your last and the preceding answer that it comes to this: If the drawer or signer of this specification meant that by this apparatus he could cool the atmosphere without its having limits, without its being encased or enclosed, in your judgment he ought to have known better—if it does mean that, the man who thought he could do it ought to have known better. That is what it comes to, isn't it?

Mr. DICKERSON, Jr.: It seems to me that that question is hardly proper.

A. In other words, if a patentee says something which admits of one interpretation and that interpretation is contrary to the fact, then he ought to have known better and should not have so stated.

Q. And if you read this patent as you understand it, so that it would necessarily imply that this apparatus was to be used

255 indiscriminately in one place or another place where they wanted to cool the air—if you read it that way, then you would say that he ought to have known better than to attempt that?

A. I should not so read it.

Q. I understand that.

A. I should say that that excluded that interpretation.

Q. And because of that interpretation being one which you think would lead to improbabilities or impossibilities, you lean rather to read it in such a way as would reconcile it with what you supposed to be feasible?

A. That is so.

Q. It comes to that, doesn't it?

A. That is so.

Q. Now, in connection with that, if you read in a claim these words, "in an air-cooler or apparatus for cooling carcasses," do not those words immediately take the device and proposition out of the domain of indiscriminate places and locate it in an air-cooler or apparatus for cooling carcasses?

Mr. DICKERSON, Jr.: That is a question of law—the construction of that claim.

Mr. CONKLING: No, sir; we are talking about the apprehension of the witness. Let the question be put again precisely.

The COURT: He has answered that. You don't need to put it again.

Mr. CONKLING: The one question we propose to your honor is this:

Q. In your opinion and understanding do not the words "in an air-cooler or apparatus for cooling carcasses" of themselves

256 denote the location or place where the apparatus is to be used by description?

A. They undoubtedly indicate by themselves, to one having

any knowledge of the art, that this was a refrigerator that was talked about.

By Mr. BENNETT:

The COURT: How long do you want, Mr. Bennett?
Mr. BENNETT: I don't want but a very limited time.

Q. As you understand this Kelly apparatus, if it is understood to be an apparatus in an apartment that is not enclosed, or in other words, as a simple air cooling and distributing apparatus, was it not, according to your understanding, used prior to Kelley's time?
A. Not this combination.
Q. I find in your affidavit, in the case against this defendant, on the chancery side of the court, the following statement: "If the Kelly patent should be construed to cover an apparatus in which the ice-box was placed in the door-yard of a house and the pipe P carried into the room in the house, then the Kelly patent might be anticipated by the Vallance and similar contrivances." Do
257 you still adhere to that understanding?

Mr. DICKERSON, Jr.: I object. These gentlemen cannot prove their affirmative defence by this witness.
Mr. BENNETT: He has placed a certain construction upon the patent. I am going to show, by his own acknowledgment, in a case against this very defendant, that he did say that if the patent was to be construed it was clearly anticipated by Vallance.
The WITNESS: I did not say anything of the sort.
Mr. BENNETT (to the stenographer): Just read the question.
Mr. DICKERSON, Jr. (to the witness): Don't answer. I think there is no question as to the incompetency of that question. Mr. Bennett has told your honor that he intends to prove by this witness that he could anticipate this patent, construing it in a certain way. If I know anything I know that is an affirmative defense. The Vallance patent is one of the things set up in these gentlemen's answer and one of the things upon which they will rely hereafter. They cannot possibly prove that patent by this witness at this time.
Mr. BENNETT: I propose to show by this witness' own acknowledgement that unless the Kelly patent is construed as he construed it to-day it is in his opinion old, and was prior to 1864. Now, it does seem to me that it is perfectly competent for me to show by the cross-examination of this witness that he has been driven to take a certain construction in order to save the patent, according to
258 acknowledgements made in another case against this defendant.

The COURT: I think you can ask the witness if his construction is such that the patent has been anticipated.
Mr. DICKERSON, Jr.: Your honor will be good enough to note an exception.

The stenographer reads the last question.
A. If it is understood that what I then expressed was not a posi-

tive opinion, but simply a doubt, I should then say that the doubt there expressed still remains in my mind a doubt.

—. You put it rather *dubitante* than as an opinion.

When you had before you the defendant's apparatus in the other case, and in your opinion you stated that this apparatus infringed the second claim of the Kelly patent, one element of that claim being "one or more perforated distributing or equalizing tubes or conduits," did you not point out as being those perforated distributing and equalizing tubes the main trunk running along opposite the sides of the model which represents the defendant's apparatus?

A. I believe that I did so.

Q. And in that connection you did not take into consideration these branch pipes, as you have termed them on this examination?

A. I took them into consideration and then regarded them simply as elongations of the perforations.

Q. That is, that in point of fact you might say they were nozzles?

A. They were nozzles.

259 Q. To let the air go out through the perforations. You did not then consider them as a system of distributing pipes separate from the main trunk, did you?

A. No; I considered them as acting with them, as adjuncts.

Q. As part and parcel of the thing?

A. As part and parcel of these.

Q. Of these trunks?

A. Of these trunks; the main trunk then being the cross-pipe.

Q. Your concluding statement was, "Certainly the fact that short nozzles are connected to these openings cannot alter the fact that these conduits are perforated through their entire extent," meaning that the fact that these nozzles were connected here did not any the less make them perforated conduits; those were the perforated distributing pipes that you referred to in pointing out the infringement of the second claim of this patent?

A. That is so.

Q. What sources of information have you had to educate yourself in reference to compressed-air apparatuses?

A. I have studied the subject theoretically and know something about it?

Q. Are you familiar with Tyndall?

A. Yes, sir.

Q. And Sir William Thompson's papers upon the subject?

A. I have read Tyndall's papers and I think some of Thompson's. I have read a great many others.

Q. Have you read Maxwell?

A. I have not studied Maxwell. I have not gone so deeply as that.

260 Q. You have read, then, I understand you, a few of Sir William Thompson's papers upon the subject, and also the remarks made by Tyndall upon the subject?

A. Yes, sir.

Q. At the time you made your affidavit as to your understand-

ing of the operation of compressed-air apparatuses had you read Tyndall's remarks upon this subject?

A. Do you mean special remarks on compressed-air apparatuses?

Q. Yes.

A. That is not what I understood you before. I don't remember any such special treatise of Tyndall's on compressed-air apparatus. I suppose you allude to his work on heat as a mode of motion.

Q. Yes; I mean his remarks referring to the mode of construction and operation of compressed-air apparatus.

A. If I understand what you mean by compressed-air apparatus, it would be such things as these cylinders and pumps, &c. He gives some experiments on a laboratory scale.

Q. Does not Mr. Tyndall in his work refer to what it is that produces the cold?

A. He may.

Q. Are you familiar with those statements of Tyndall in his work on heat, where he refers to the operation of the expansion cylinder and the work, if any, to be performed by the piston or by the compressed air?

A. As I said just now, I do not recall in Tyndall's work on heat anything as to compressed air, expanding air, engines, and so on. It must be in some edition later than the one that I am familiar with. If you will quote me the words——

Q. Do you recall something like this as being contained in
261 it: "B[illegible]he refrigeration which accompanies expansion is in reality due to the consumption of heat in the performance of work. Where no work is performed there is no absolute refrigeration."

A. That is true; understanding that when he talks of work he does not mean available work only, but any sort of work—interior work in the gas itself, for example.

Q. Did you understand that at the time you made your affidavit in this case?

A. I understood that subject as I understand it now.

Q. Were you also familiar at that time with the papers of Sir William Thompson—his mathematical and physical works?

A. Reasonably familiar. Very few people could do much else if they were to make themselves thoroughly familiar with those papers.

Q. Have you any other means of knowledge upon this subject other than scientific works such as you have had occasion to read in the course of your professional duties?

A. I have made limited laboratory experiments similar to those of Tyndall's and others, and I have had a good deal to do with machinery in which compressed air was used, and so on.

Q. Do you know of a single instance where a compressed-air machine was used in this country prior to 1864 for producing cold?

A. Oh, yes; in New Orleans.

Q. In what connection was the use of that apparatus?

A. I have got a little memorandum of the day and date that I made (referring to memorandum). In 1849 and 1850, J. Gorrie.

Q. Dr. Gorrie?

262 A. Dr. Gorrie made ice machines—machines for producing ice by compressed air.

Q. Do you know of any case prior to 1864—in fact, I may say prior to the Bell-Coleman apparatus—that a compressed-air refrigerating apparatus was used for producing cold for reducing the temperature of chambers—refrigerating apparatus?

A. I cannot say that I know that this was done. There is that apparatus which was used for cooling—for making ice and undoubtedly for cooling in similar places; and then there was the machine of Kirk. In 1863 his patent was taken out.

Q. In all of those cases, especially referring to Dr. Gorrie's compressed-air apparatus, was there not another element used that is entirely absent in the defendant's apparatus and one that was essential to the operation of those machines?

Mr. DICKERSON, Jr.: Can't you point it out, Mr. Bennett?

Q. In other words, did they not use in Dr. Gorrie's machine and in all machines that you have read of prior to 1864 brine in the expansion cylinder?

A. Certainly not in the expansion cylinder; but for the purpose of carrying the cold to a distance brine was used as a circulating material instead of air, for instance, in this case.

Q. Then, I understand you, brine which had gone off and performed its work and taken up heat to a certain extent came back to where the compressed air was expanded, received the cold from the expanded air, and carried the cold off in that condition?

A. In that machine that was the way.

Q. Are you certain that you are correct in saying that in

263 Dr. Gorrie's machine brine was not injected into the expansion cylinder itself?

A. I have no recollection of that. I saw a drawing of it recently. It might have been done; I have forgotten. It would not make much odds.

Q. In fact, it was so. There was brine in the expansion cylinder.

A. The drawing did not show it and I overlooked it.

Q. Do you know of a case prior to 1864 where the expanded air left the expansion cylinder and was introduced in an apartment to cool it?

A. Yes; in one sense. Wherever rock-drills, driven by air, were used in mines and tunnels, exactly that thing happened. The air that escaped from the rock-drill was very cold; it would produce frost and ice around the outlet valve, and, escaping into the tunnel or mine, cooled it and had a very useful effect in that regard. In the Mt. Cenis tunnel this was the way a great deal of the ventilation was obtained.

Q. Are those cases where the compressed air was allowed to expand into open space?

A. No; not simply. It was, of course, used in doing work.

Q. Now, coming back again to Dr. Gorrie's apparatus, which you

seemed to state as being the best apparatus known prior to 1864, if I understand you——

A. That and Kirk's.

Q. That and Kirk's—there the cold produced by the expansion of the air was conveyed off by the aid of brine?

A. Yes; that is substantially true.

264 —. Therefore prior to 1864 you knew of no compressed-air apparatus that was used in connection with a refrigerating apartment in such a manner that the expanded air itself was introduced directly into the apartment to be cooled?

A. Except these cases of the rock-drill, a great many of them.

Q. You would hardly call that a place where you would refrigerate anything, would you?

A. No; it was not a chill-room. If any one had wanted to refrigerate they could have done it. That showed them how.

Q. Do you know of the existence of any compressed-air apparatus of the construction of the defendant's apparatus, and operated upon the principle that it does operate, existing prior to 1864 as an entirety?

A. No; I do not, taking all the details that are there shown.

Q. Now, I should like to know from you whether you have yet discovered a successful compressed-air apparatus that existed prior to 1864.

A. As I understand it, Kirk's was successful and Gorrie's, to a certain extent. It was not economical.

Q. I understand you that Mr. Kirk also used brine for conveying off the cold?

A. I believe he did.

Q. That, then, is a radical distinction——

A. I don't think so.

Q. (continued)—between Kirk's and Dr. Gorrie's and the defendant's apparatus?

A. I should consider it was a very small distinction.

265 Q. Notwithstanding the fact that there the brine was injected into the compression cylinder, took off the cold, conducted it away, deposited it in contact with the surfaces that it was brought to (we will say boxes containing ice) in order to freeze them, and then, having taken up heat, that heat, with the brine, was brought back into the cylinder again?

A. It was using brine instead of air as a vehicle for cold.

Q. And, in your opinion, that is not a very great difference?

A. No; it is not, for certain uses. It might be in some cases.

Q. In those apparatuses in which brine was used could you possibly have a circulation of air—of the compressed air?

A. There would be no object in it.

Q. Could you have it? That is the question.

A. I think an apparatus could be so organized as to allow the air also to circulate, as well as the brine.

Q. Do you have it in either of the apparatuses of Dr. Gorrie or Mr. Kirk?

A. I have no doubt you could readily in that of Kirk, and in that of Gorrie it would merely need a water trap to separate the brine.

Q. It would need arrangement?

A. Slight; such as any plumber would understand.

Q. As matter of fact, could you take Dr. Gorrie's apparatus or Mr. Kirk's apparatus, as described by them and as used by them, and cause a circulation of the air?

A. Certainly not.

266 Q. In the defendant's apparatus the compressed-air apparatus, which is the only means by which the cold is produced, is situated entirely outside of the apartment to be cooled, is it not?

A. It depends upon what you call the "apartment." It is enclosed from the apartment. There is a large apartment, and this machinery is shut off in a box occupying part of it.

Q. And is it not shut off, for all practical purposes, as absolutely as if it was on the main deck?

A. Yes, sir.

Q. Now, then, we have first the distinction between the defendant's apparatus and Kelly's apparatus in that in the Kelly refrigerator the apparatus was in the apartment to be cooled, whereas here that which produces the cold is entirely outside of the apartment to be cooled?

A. I don't think there is any distinction at all.

Q. Isn't there a difference?

A. No; not any difference. In other words, nothing would have prevented making a partition across in the Kelly apparatus, just such a partition as you have here, and then the things would have been perfectly identical; and whether it was in a room partitioned off in a corner or not partitioned off in a corner, but is in the same room, makes no sort of difference.

Q. I understood you to say that it is the very essence of the Kelly apparatus that it should be used in the refrigerating apartment.

267 A. Not in that sense at all, but only in the sense that it must take its air from the room and return the air to the room exactly as it does when it is in the room. You may push it just outside the door, leaving the connections the same, and it manifestly makes no difference.

Q. I desire you to bear distinctly in mind—lest you might hereafter forget it when you have an opportunity, if you ever do, of being called in reply to things that are produced here—that you have stated that it makes no difference whatever where the means for producing cold is situated so long as the pipes are introduced in the apartment to be cooled to let in the cold air and so long as there is an outlet to let the warm air out.

A. I have not said anything of the sort.

Q. Let us have no misunderstanding. Is it or not important, according to your understanding of the Kelly apparatus, that it should be located in the apartment to be cooled?

A. Not of the slightest degree important that it should be located in the apartment to be cooled, but it is vitally important that it should be in so close proximity to the apartment to be cooled that

there shall be a direct communication from the apartment to be cooled, by which the air may be drawn into the ice-box and from the ice-box sent out again and distributed through the apartment.

Q. In other words, so long as there would be air-tight connections from the means of producing cold to the refrigerating apartment, so that the air could be forced into the apartment to be cooled
268 and in its turn could be taken out of the apartment to be cooled back to the means of producing cold, that would be the Kelly apparatus?

A. That would be the Kelly apparatus.

Q. And therefore you do not think that it is a matter of any difference that this compressed-air apparatus is situated outside of the apartment to be cooled?

A. That it is, in other words, fenced off from the rest of the apartment?

Q. Yes.

A. No; it makes no difference at all.

Q. Now, coming to the mode of operation of the defendant's apparatus, you have spoken of the snow-box, where I believe you say the vapor takes the form of snow and is deposited; does that snow being deposited there perform any office whatever?

A. It takes moisture out and impurities.

Q. And then it is not necessary that you remove that snow?

A. From time to time; yes.

Q. And if you did not remove that snow from time to time you would soon have a clogging of the distributing pipes?

A. It would clog them up, I presume, in time.

Q. Do you believe it would be possible to take the Kelly system of distributing pipes, with perforations on the under side, and use them with a compressed-air apparatus such as the Bell-Coleman and have it operative?

A. Yes, sir.

Q. You think so?

A. Yes, sir.

Q. How often do they remove the snow from the snow-box?

A. I don't know; but it would merely require a little dif-
269 ference in the adjustment of the parts to prevent it ever forming there.

Q. Do you understand that the snow is removed constantly?

A. How often I do not know. Some time or other it is removed, I presume.

Q. That performs no office after it has been deposited in the snow-box?

A. No; it is no useful part of the apparatus.

Q. And does not aid in refrigerating or cooling the air?

A. Substantially not.

Q. Where do you understand that the expansion takes place that produces the cold in the defendant's apparatus?

A. The production of low temperature—it might be well to make a distinction between producing cold and producing low tempera-

ture—the production of low temperature occurs substantially in the expansion cylinder.

Q. To what fact is due the great reduction of temperature when the compressed air is let into the expansion cylinder?

A. Loss of motion of the air particles. Their vibratory motion is reduced in rapidity.

Q. Suppose you were to let that compressed air expand into space without performing work, would you get any reduction of the temperature?

A. If you could do such a thing you would get no reduction of temperature, but you cannot let air expand into space without doing work. It has got to lift the atmospheric pressure.

270 Q. What is the utmost limit of reduction when you permit it to expand so as only to lift the atmosphere?

A. I cannot give you the numbers, but a considerable reduction can easily theoretically be shown. It is the amount of work done in lifting—whatever that volume may be—lifting fifteen pounds to the square inch through so much space.

Q. Don't you know that it has been a matter of considerable scientific discussion of late as to whether or not it would change the temperature in the least, and has it not been arrived at as a scientific fact that where the compressed air is allowed to expand into space with only the resistance that you speak of that there would not be any reduction of temperature to exceed one degree?

A. No; I don't know that.

Q. Suppose I should satisfy you that that is the belief of Sir William Thompson and other noted writers, would you then be inclined to think that probably you were wrong, owing to the fact of lack of experience?

A. If I knew that you understood what they meant and they said so then I would change my view.

Q. Is it not in the defendant's apparatus one of the very essential conditions in order to produce the cold that the condensed air—or, in other words, the stored energy in that compressed air—be compelled to perform work?

271 A. It is one of the conditions, but another is that the stored energy in that air when it is first compressed a large part of it should be taken out by the sea water that is brought in contact with it. If that is not done you certainly would not get a particle of cold; no doubt about that.

Q. Do you know how much heat is taken out by that sea water?

A. All the heat that is involved in lowering the temperature from some three hundred and fifty degrees or so down to whatever temperature it is.

Q. Leaving the port of New York, between here and Sandy Hook, what would be a fair average of the temperature of the water?

A. It depends upon the season. I should think about from fifty to sixty.

Q. What would it be this time of year?

A. I think a little under sixty.

Q. Then how much heat would it be possible to remove, bringing it in contact with water of a temperature of sixty?

A. Do you mean how much heat, expressing it in relation to work?

Q. What is the temperature of the compressed air after it leaves the water tower?

A. I don't know exactly what the temperature is.

Q. Couldn't you form an opinion as to what it would be, owing to the fact that it is brought in contact with water of a temperature of about sixty?

A. It depends upon how thorough the contact is, but it might be reduced to very nearly sixty.

Q. That is, at that point, even if a higher temperature than
272 the air that was introduced into the compressor, is it not?

A. Yes, sir.

Q. Is there any expansion in the water tower?

A. Nothing of any moment.

Q. As a matter of fact, is it not still compressed to a greater extent?

A. Yes, sir; it is substantially as it was.

Q. You still have a compression?

A. You still have a good deal of energy in the air—yes, sir.

Q. When we go to the scrubber, as it has been termed, is there any expansion there?

A. Very little.

Q. As a matter of fact, is it not condensed to a great extent or some slight extent?

A. Condensed?

Q. Yes; compressed.

Mr. DICKERSON, Jr.: Your question is not English. What do you mean?

Mr. BENNETT: Further compressed.

A. Further compressed in the scrubber?

Q. Yes.

A. No; there is nothing to compress it there. It would be under the same pressure.

Q. Then we have arrived at the fact that in the scrubber, which is for the sole purpose of removing the water——

A. I should not call that the scrubber; the other is the scrubber.

Q. We will call it the perforated diaphragm for removing the water that is mechanically mixed there; that is the only office, I understand, of the second tower?

A. Yes.

273 Q. The air is still in a state of compression?

A. Yes.

Q. And would be of a temperature to exceed sixty?

A. Yes.

Q. And now it goes from there to the drying pipes?

A. Yes, sir.

Q. Is there any expansion there?

A. No.

Q. None whatever?

A. None whatever.

Q. Is it further compressed there?

A. No; the pressure in all those places would be substantially the same. There are no valves between them, and there could not be any difference in pressure, as I understand the construction of the apparatus.

Q. Let me ask you whether that water which it came in contact with did not at the same time that it removed the surplus heat take off a certain amount of impurity?

A. Yes, sir.

Q. In this coil of pipes through which the air passes, which you have termed the drying pipes, as I understand, you say the air is dried still further and that the impurities are further reduced there?

A. Yes, sir.

Q. Now, that air in that state of compression and at a temperature of sixty goes to the expansion cylinder. What becomes of it there?

A. There it expands.

Q. It is made to perform work, isn't it?

A. It performs work; it performs exterior work.

Q. That is, of operating the piston?

A. Of operating the piston.

Q. What is it contained in that compressed air that performs that work, as you understand?

274 A. The vibratory motion of its particles.

Q. Would it be improper to say that there is a certain amount of stored heat there?

A. No; I should not call it stored heat. There are stored particles.

Q. Stored energy?

A. Not in that shape. The particles are crowded together and, having these vibratory motions, they strike harder; more of them strike in a second, moving at a given rate. The temperature depends upon the rate of movement. There would be a great many more of them, and therefore on a given surface they would strike oftener and produce a greater pressure on that surface than the air in normal conditions.

Q. Now, suppose we were to remove the piston from the cylinder and permit it to expand into that cylinder, what reduction of temperature would you get?

A. If the cylinder was full of air, to begin with, and you expand it into that cylinder you would have to push the air out, and that pushing of it would amount to doing some work, and it would be a reduction of temperature.

Q. To what extent?

A. I cannot say; but I know from observation that there is such reduction of temperature.

Q. Owing to the friction of the particles themselves, there would be certain counteracting influences, would there not?

A. There would. I have already explained that in my direct testimony.

Q. Tell me if those counteracting influences would not
275 overcome any slight reduction that might be made in the temperature by reason of its being permitted to expand in the cylinder without the piston.

A. I don't believe they would.

Q. Have you ever made any experiment to determine that fact?

A. An experiment which, I think, determines the same fact, namely, allowing air to escape from a vessel in which it was compressed, whereupon the whole temperature of the vessel falls.

Q. Did you measure the increase of temperature a slight distance away from where the reduction in temperature took place?

A. No.

Q. Is it not entirely due to the work that is performed there that we get this very low temperature in the defendant's apparatus?

A. No; that is one of the essential conditions. You would not get that if you did not cool the air between times. In other words, if you left out that scrubber, and so on, and simply compressed the air and allowed it to expand, you would not get any cold at all.

Q. Then these two towers do perform a very essential part in the defendant's apparatus?

A. Unquestionably.

Q. Do you know of any apparatus that existed prior to 1864 in which the arrangement of the two towers was present?

A. Exactly that form, no; but it is true similar means of cooling air have been used.

Q. What was Dr. Gorrie's method for doing that?

A. He squirted water into the compressed air and then al-
276 lowed it to pass out into a vessel, water and all, in which it cooled.

Q. With brine?

A. No; no brine.

Q. But you have never found present in any compressed-air apparatus the arrangement of these two towers; and without these two towers, I understand you, you would get no result from the defendant's apparatus?

A. Unless you used some well-known equivalent for those towers, some method for cooling the air; otherwise, they would burn themselves up in a little while.

Q. That—whatever you may term it, I will call it stored energy—that is in this compressed air, in the defendant's apparatus takes the form of work—goes off in the form of work?

A. It is disposed of in some form of work, exterior or interior work.

Q. In this particular apparatus, the operation of the piston?

A. That is part of it.

Q. Suppose you took the piston out and you had no work to perform except remove the air that is contained in there, what would become of the stored energy—what form would it take?

A. As I have already explained, part of it would be used up in

displacing the atmosphere; in other words, in getting out and putting in motion the atmosphere itself, part of it would be used in the frictional motion of the air particles against each other in
277 striking on the walls, and so on, and that would be reconverted into heat. I explained that on my direct examination.

Q. Then if that piston was removed you would have a certain amount of heat there which you do not have in the defendant's apparatus, owing to the work performed by the operation of the piston?

A. As I have said in my direct testimony, the office of that piston is to take work that the air has got to perform somewhere and prevent it performing it at the wrong place and make it perform it at the right place.

Q. And consequently if you did not take that out to the extent that we do by making it perform work it would make a reduction of temperature?

A. Some degree of reduction.

Q. Therefore it is not incorrect for me to sum up the operation of our apparatus as follows: That we first take the air and add heat to it to a very high degree; we next bring it in contact with water and remove a certain amount of that heat, yet leaving it at a temperature far above or considerably above what it was when it was introduced in the compressor?

A. Of course, heat and temperature are quite different things; but, bearing that in mind, your statement is correct.

Q. From that it proceeds until it comes to the expansion cylinder; there it is expanded and our low temperature (confining yourself to our apparatus) is mainly produced owing to the work which the stored energy performs?

278 A. That is true.

Q. Does the air further expand in our apparatus than the snow-box?

A. I don't suppose it does much, but I suppose it does a little. They cannot work with no pressure at the exhaust; they must have something to get clearance.

Q. But, as you understand the operation, the office of expansion is fully performed and the result performed, namely, the low reduction of temperature in the expansion cylinder?

A. That is the place.

Q. Is there any difference in the temperature of the expanded air at the point when [where] it leaves the expansion cylinder and at the point where it is introduced into the refrigerating apartment through the distributing pipes?

A. None but the very small difference due — the loss of cold or acquisition of heat in passing through these tubes.

Q. That is, heat caused by friction passing along through the tubes?

A. Yes, sir.

By the COURT:

Q. Would the defendant's apparatus be an efficient one if there

were no distributing pipes and air was introduced into the apartment simply from the expansion cylinder?

A. No; it would not be a useful apparatus.

By Mr. BENNETT:

Q. Have you ever made any experiment to determine that?

A. What I stated in the answer to the last question?

Q. Yes.

A. No; it is merely a matter of judgment.

279 Q. Suppose it should prove to be a fact that this Bell-Coleman apparatus is used and its use is almost solely confined to refrigerating compartments where there are but one or, at most, two openings, so as to admit of the cold air, and but one opening for returning the warm air, and that it should be shown to you that such a construction and arrangement had been used and was now in use daily for the transportation of meat from port to port, occupying, say, twenty-eight days, and that it preserved each and every quarter of meat hung in the refrigerating apartment, what, then, would be your opinion?

A. My opinion would be that that supposed apparatus that you describe to me must contain some arrangement which takes the place of the distributing conduits in securing an equal distribution of air through the chill-room.

Q. Supposing, as a matter of fact, that the only pipes or conduits there are in the chamber are a tube, one on each side of the apartment, and having an opening into the refrigerating apartment about midway of the chamber, and but one outlet, and that to an upper apartment which is to be refrigerated with the same air, and but one outlet from that upper apartment into the compressed-air apparatus, and that such an arrangement had successfully preserved meat as an ordinary business of commerce for a period of twenty-eight days, what would be your opinion?

A. I should say, as I said before, that I think some adjust-

280 ment—some means or some arrangement—must have been made to accomplish this result, and that if that was a substantially different thing nobody need bother about the Kelly patent any longer.

Q. Supposing that there were no changes other than those that I have stated——

The COURT: He says that there must have been some conditions that you have not stated. If there were no further conditions, then he says, to use his own language, that nobody need bother about the Kelly patent.

Q. Then you would be mistaken in your opinion that the introduction of the cold air from the compressor into the refrigerating apartment without this series of pipes here would not produce an equable distribution of air so as to preserve the carcasses contained in the apartment?

A. I should then conclude that that opinion, broadly stated, was an error.

—. By "that opinion" you refer to your own?

The WITNESS: That my opinion, broadly stated, was an error.

Q. Your own opinion that you gave a minute ago, that you could not get an equable distribution without these distributing pipes in the defendant's apparatus, is based entirely upon your judgment, without ever having made any experiments to determine the fact?

A. It is based on my judgment.

Intermission.

281 After recess.

Cross-examination of HENRY MORTON continued.

By Mr. BENNETT:

Q. You stated that, in your opinion, it would not successfully refrigerate, as I understand you, if the air from the condensing cylinder was introduced directly into the apartment without being distributed through the system of pipes shown in defendant's model. Suppose you were to dispense with the system of pipes which are designated by the letters *t t t* and had the perforations here which you state were within the second claim of this reissue patent, would you then be able to successfully refrigerate with the aid of the apparatus?

A. I might be.

Q. Is it not your opinion, considering the temperature that we are enabled to derive by the compressing-air machine, and having this main trunk with perforations in it, that it would be a successful refrigerator and secure an equable distribution of air?

A. I think, in view of everything, considering, among others, the fact that air will be thrown out as you suggest it would be, in puffs, that it might answer without those nozzles.

Q. That is, without the pipes *t t t*?

A. Yes.

Q. Do you know to what extent air is compressed in defendant's apparatus?

A. I do not.

Q. You understand that it is compressed to the extent of one-quarter of its bulk?

A. I should suppose so, at least.

Q. Say that the air is compressed a quarter of its original
282 bulk.

A. Then I should presume it would run out.

Q. You have never seen this machine operated so as to be able to say anything about it?

A. No; I have not seen this machine operate.

Q. Therefore you cannot say as to the extent to which that compresses the air?

A. I cannot say.

Q. You have stated that you understand that the air is compressed at least one-quarter of its bulk. Such being the fact, would it be

possible in defendant's apparatus to substitute the fan in place of the piston of the compressing cylinder and have it operative?

A. It would not be; you could not get such a pressure.

Q. In other words, it would be impossible to substitute a fan in defendant's apparatus for these pistons which you say are the equivalent of the Kelly fan and have the machine operative?

A. I say that these pistons are the equivalent of a fan for the purpose of moving the air; but moving the air does not call for any such pressure, and that pressure is not used for the purpose of moving the air, nor is it availed of.

Q. That pressure is the only means by which the air is cooled, is it not?

A. That high pressure is essential for cooling the air, but not for moving it.

Q. Then I understand you could not substitute in defendant's apparatus a fan for the piston, which you have said would be the equivalent of the Kelly fan, and make it operate?

283 Q. You are wrong about that. You can substitute a fan for the pistons so far as they are used as the equivalent of the fan, but you could not substitute a fan for the pistons as far as they are the equivalent of an ice-box.

Q. In other words, if you did not have the pistons you could not operate the apparatus at all, even if you had a fan?

A. You could not operate the apparatus as a whole, because you would have no equivalent of the ice-box; neither could you operate the apparatus without an ice-box.

Q. Do I understand you that these pistons are not only the equivalent of the Kelly fan, but likewise a portion of that which constitutes the equivalent of the Kelley ice-box?

A. Undoubtedly.

Q. I desire to ask you once more: Could you substitue in defendant's apparatus the Kelly fan or any known fan and operate the defendant's machine to produce the result necessary in order to make it a refrigerating apparatus?

A. Certainly not, because you would then be called upon to substitute a fan for an ice-box.

Q. Would it be possible under any possible arrangement to make a fan compress the air to such an extent as is necessary to get the subsequent reduction of its temperature, owing to expansion?

A. I do not think it would be.

Q. Turning again to the question of performing the work. In an affidavit made by you in the case against this defendant, on the chancery side of the court, I find this statement: "Mr Elliot

284 is evidently very ignorant of the principles governing the operation of defendant's apparatus, for he says, at folio 284, that the reason of the cold produced in the expanded air in defendant's apparatus is because that air 'is conducted to an expanding engine where it is made to perform such work.' The resultant temperature of the expanded air would be precisely the same whether it expanded in a chamber with the piston in it or in a chamber without a piston, and almost all apparatuses producing cold by the

expansion of the air with vapor allow the air or vapor to expand without passing through any working cylinder whatever." Are you still of the opinion that Mr. Elliot was ignorant of the principles which govern the defendant's operation because of that statement?

A. I am; because he confined the production of cold to the expansion, and it is perfectly true that if the air had not been cooled after its compression there would have been no cooling produced on its expansion; therefore expansion alone would not have produced the cold.

Q. I believe you stated a moment ago that in our apparatus the air was conducted to an expanding engine, where it was made to perform work, and that it was owing to the performance of that work that we got rid of the restored energy and the low temperature of the air?

A. Partly; yes.

Q. Are you still of opinion that the resulting expanding air would be precisely the same whether expanded in a chamber with a piston in it or in a chamber without a piston?

A. No. I have there overlooked the fact that I have ex-
285 plained in my direct examination, that by the use of the piston, properly used, we could carry away the work and get it to a distant place, and thus prevent the production of heat, which otherwise would occur, in the chamber, and therefore diminish the amount of cold that we obtain; so that the cold produced under those circumstances is greater where we have that exterior work.

Q. Then, that stored energy which was made to perform the work, if it did not perform the work, would become equivalent to so much heat in the expanded air?

A. It would be converted into heat. That is what becomes of all energy.

Q. And therefore it would be impossible to get the low temperature that we get by performing the work from the piston?

A. It would be impossible to get a temperature, all the other conditions remaining the same, as low as you now get it.

Q. Are you still of the opinion that almost all apparatuses for producing cold by expanding air or vapor allow the air or vapor to expand after passing through the working cylinder?

A. That is so where the apparatus is one that produces cold slowly by expansion.

Q. That is, you are still of the opinion that in almost all apparatuses for producing cold by expansion the air is allowed to expand after performing the work?

A. That is the case with reference to the machine I had in mind, which were chiefly ether machines, &c.

286 Q. And the other machines, of course, which you particularly mentioned along with that?

A. You mean the Gorrie machine? I do not include that. That does not operate slowly by expansion, but by pressure. It was exactly like this machine in using the compressed air after it had been cooled and then working the piston in compressing more air.

Q. But it had a refrigerating fluid passing through the pipe?

A. There was a refrigerating fluid for the purpose of distributing the cold.

Q. You have made mention during your examination as to the importance, in the Kelly apparatus, of the system of pipes *t t t*. Have you ever made any experiments to determine whether or not an equable distribution could be obtained in an apartment without those—that is, simply by having one outlet and one inlet at opposite ends of the room?

A. I have never made any experiments of that kind.

Q. You cannot tell from personal knowledge whether those pipes *t t t* are essential in order to obtain an equable distribution of air where you are using an apparatus with ice-box and fan?

A. I cannot tell without experiment.

Q. Suppose it to be a fact that in an refrigerating apparatus, consisting of an ice-box and fan and of one inlet and one outlet at opposite ends of the room, there would be caused an equable
287 distribution of air in a chamber 160 feet long, 14 feet high, and 27½ feet wide. Would you then say there was any necessity for the small pipes *t t t*?

A. I should say that under the conditions you mention the good effect was obtained by natural and not by a forced distribution of the air.

Q. Do you think that in an apartment of that size that you could get an equable distribution of air throughout all parts of the room by the natural circulation of the air?

A. I should not think so.

Q. Therefore the fan in that connection would perform a very important office?

A. It would perform some office, but not in distributing the air through the room. It would bring the air into the room and take it out again.

Q. Suppose that I had in this chamber, which I have stated to be 160 feet long, 14 feet high, and 27½ feet wide, an ice-box having an inlet and an outlet in the refrigerating apartment, and that combined with that ice-box I had a fan 6 feet in diameter, do you think that would cause a forced circulation of the air throughout that entire chamber?

A. It would cause a circulation of the air, but whether it would be the circulation throughout the entire chamber, in the sense of making an equable distribution, I should doubt very seriously.

Q. Would you say that it was an equable distribution throughout a chamber of that kind where there was no greater variation
288 throughout the entire space than from 4 to 6 degrees?

A. I should say that that was very equable.

Q. What do you consider an equable distribution?

A. There ought not to be more than a degree or a fraction of a degree difference in the different parts.

Q. You would not have an equable distribution if it should prove to be the fact that in defendant's apparatus there was a variation in

temperature of, say, at least 3 degrees, from one side to the other side of the apartment?

A. That would depend wholly upon the time. At the moment that the apparatus was shut up and you were just introducing the cold air, then of course near the pipe where the air was introduced you would have it a great deal colder than it would be some feet off. If the apparatus had been operating for a long time, then the difference would be reduced.

Q. Supposing that in mid-ocean, after being out four days with defendant's apparatus, it should be shown by tests made that there was a difference in the temperature of the room, between one side and the other, of, say 3 degrees. Then, in your opinion, that would not be such an equable distribution as is contemplated by Kelley?

A. It would depend. He does not limit it to a difference of degrees. As long as it produces the good effects that he indicates it would be impossible to say just how many degrees of difference there might be.

By Mr. CONKLING:

Q. But it would not be that equable distribution that you
289 spoke of a moment ago?

A. It would not be as perfect and equable a distribution as I should think would be the best.

By Mr. BENNETT:

Q. Have you ever taken the trouble to ascertain what would be the difference in temperature, if any, in the different parts of the room in the refrigerating apparatus which was formerly used by T. C. Eastman on the steamship?

A. No.

Q. Suppose that with this apparatus, with the model of which you are perfectly familiar, the log-book should show that there was a variation in the different parts of the room of from 4 to 5 degrees, would that be an equable distribution, as you understand that phrase?

A. That would indicate a lack.

Q. The same thing would be true in the apparatus used by the present defendant, would it not, if it should show from tests made in mid-ocean after the vessel had been out several days that there was a variation of from 3 to 5 degrees?

A. Under certain circumstances it would; but if there was that variation between thermometers placed right close to the outlet, then it would not affect the question, because this air might be let in intensely cold, and especially it might be done so at times—of course the matter would all be under the control of the person managing it—and in this way you might get at any moment an intense cold at these nozzles and a relatively warmer temperature at other places.

Q. Suppose that in this room, 160 feet long, 14 feet high, and
290 27½ feet wide, using the ice-box and a fan 6 feet in diamater, that by actual tests taken throughout, every so many feet in

the room, say every ten feet in the room, that it was shown that there was not a variation even from the point of the inlet of the cold air to the point where the warm air was taken exceeding 4 or 5 degrees, would that be an equable distribution within that apartment?

A. It would not be such an equable distribution as I should expect from an apparatus when properly working.

Q. And yet you have never made any experiments to ascertain what variation there would be in an apartment of that size or of any other size with the identical apparatus such as is shown in the patent?

A. I some time ago observed the temperature of this chill-room uptown and found that there was very little difference in the temperature of the different parts of the room.

Q. What volume of air would a fan 6 feet in diameter move?

A. It depends on how fast it is running.

Q. Suppose a fan 6 feet in diameter moving at the rate of 600 revolutions per minute. How much air would that move—what volume of air?

Mr. DICKERSON, Jr.: What is the length of the fan, and is the outlet an inch or a foot wide?

Mr. BENNETT: I will give you the exact figures.

Q. Suppose the outlet of the fan to be 18 inches?

A. You will find all these things in tables, but I cannot carry them in my mind.

291 Q. How long do you suppose, after running at the rate of 600 revolutions per minute, the fan being 6 feet in diameter and the outlet 18 inches, it would take to change the air in an apartment 160 feet long, 14 feet high, and 27½ feet wide?

A. As I do not know how fast the air would move, I cannot perform the calculation. If I had the figures I would do it readily.

Q. Tell us, if you know, how long it takes to change the air in the defendant's apparatus or in the apparatus which is shown by this model.

A. I do not know.

Redirect examination by Mr. DICKERSON, Jr.:

Q. You have been asked in regard to the rapidity of the circulation necessary in this apparatus and you have stated that the necessary rapidity would be controlled, to a certain extent, by the size or arrangement of the distributing openings. Is there any other fact in connection with the temperature which would determine the necessity of this rapidity and how great it was?

A. Of course, the temperature of the incoming air. The colder the air the less rapidity would it need to be circulated to produce a given effect.

Q. You have also been asked concerning grain bins. Assume that the grain bins referred to were small, comparatively small, receptacles containing the grain, which were located in a large

chamber in which the Kelley apparatus was placed, would
292 there be any difficulty then in the operation of the Kelley apparatus to cool those grain bins?

A. No; not under those circumstances. It would cool the grain bins from the outside individually, but they would be in the inside of the building containing them.

Q. You have been asked likewise as to the temperature produced in the Kelly apparatus. Supposing that you desire to produce a temperature of 28 degrees Fahrenheit instead of a temperature of 34 degrees, is there any well-known means of doing that in the Kelly apparatus?

A. Certainly; by mixing salt with the ice.

Q. You have likewise been asked a question with relation to the chamber in which an ice-box is located over the ceiling. Assuming such an ice-box to be located over the ceiling of a room, over the carcasses to be cooled, and to be unprovided with any insulation on its bottom, state what, if any, results would happen from the condensation on that ice-box.

A. The moisture from the ice-box would condense and drop down, falling on the carcasses, to their manifest injury.

Q. Some point has been made with regard to the use of the Coleman device and a mechanical piston moving in the path of the expanded air. State whether that contrivance was well known before 1864, in connection with this class of apparatuses, where the low temperature was produced by the expansion of the air.

A. It existed in the Gorrie apparatus. In other words, compressed cold air was let in at the side of the piston of the com-
293 pressor pump opposite that side which was then filled with the air to be compressed to help the compression. The same thing was also true in cases like drills used in tunnels. There the compressed air was caused to give up work before it escaped and did its cooling effect.

Q. Is it not a fact perfectly well known in scientific books that a low temperature can be produced by the expansion of air independent of its being mechanically worked? I allude, for instance, to Mr. Tindall's work and the extent of the compressed air in the box therein referred to.

A. Certainly. It is illustrated in Tyndall's work, and every professor who has had any experiments to perform is familiar with the fact that when he began to exhaust the receiver of an air-pump as soon as some of the air is taken out of it a cold is produced because of the chill of the remaining air, and a deposit of moisture is made because of the freezing or the chilling out of the moisture of the residual air. That is alluded to in Tindall's book.

Q. I refer, for instance, to the well-known experiment of freezing water by evaporation by ether in an air-pump. Will you explain how that is accomplished?

A. The water may be frozen in an air-pump without using any ether—frozen by its own evaporation—merely by placing some sulphuric acid in the pump to absorb the vapor formed. Then, when the expansion into the vapor occurs, it passes so rapidly to cool air

and then it freezes. When the pressure is relieved the evaporation takes place so rapidly as to cool the water until it freezes.

294 Q. In all those cases, will you be good enough to explain what is the cause of the reduction of the temperature? I refer to the cases of evaporation or the expansion of gases or of liquids in the condition of vapor into gases.

A. In all cases it is the result of the loss of vibratory motion in the particles of the body. In the case of the air-pump, when we have taken some air out, the remaining particles that are left having more space to go in, are allowed to go further and do not make as many contacts between each other, and consequently their velocity of motion and of impact is lost or diminished. It is the same way with the vibrations of liquids. The particles are allowed to fly off from its surface, and motion is thus lost to particles that otherwise would fly back from the surface, escape, and carry with them certain motion.

Q. I hand you Mr. Tyndall's book on "Heat a Mode of Motion," being the edition of 1883, and I call your attention to figure 6, on page 15 of that work, which represents a box containing compressed air which has been allowed to stand and cool, so that the heat due to the compression has been radiated into the external air, and in which subsequently the air has been allowed to blow itself out of the box by its own expansion, thereby showing a considerably reduced temperature. Will you be good enough to explain the principle of that experiment a little fuller to the court?

A. The air has been forced into the box previously by an air-pump, the work being done upon it in compressing it and
295 forcing it in, and which then appears largely as heat—the air in the box being quite hot. If it were allowed immediately to escape its temperature would be the same that it was before it was pumped in. It would be neither hotter nor colder than it was before; and if in escaping it struck upon a thermo-pile or other means of measuring heat it would heat that, because it would strike blows—the little particles striking blows would produce a vibration, which would amount to producing heat. If this box is allowed to stand for awhile then the energy largely escapes by radiation, the air inside of the box becomes cooled. Under this circumstance, if the aperture is opened the particles of air fly out and are free to fly apart from each other, and thereby their vibratory motion or impact, flying backwards and forwards, is diminished, which means that their temperature is lowered, for temperature is simply a question of the quickness of vibration, and this is so not only with the particles remaining in the box, but also with those that fly out; so that under those conditions, if these particles had struck upon a thermo-pile, though some heat would be developed by the blow, nevertheless the total effect is cold, and, as Tindall points out, the pile is chilled under those circumstances.

Q. In principle, does that operation represent the operation of cooling in all those compressing air machines?

A. It represents a large portion of it.

Q. And, in the defendant's apparatus, will you state what is

substituted for the loss of heat due to reduction in the Tin-
296 dall apparatus by allowing the box to stand over night?

A. Largely the scrubbing or bringing of hot air in contact the ocean water. That is really the only thing that takes heat with energy out of the entire apparatus; otherwise all the heat energy is merely shoved around from one part to another.

Q. Will you state whether the capacity of water to absorb and remove actual heat is great or small?

A. It is very great.

Q. As compared with other bodies, what is it?

A. It is highest; its latent heat, is, as I recall it, the highest of all.

Q. You have been asked, likewise, with reference to the impossibility of refrigeration in an apparatus not containing a forced distribution throughout its entire extent. Have you been informed that such results have been accomplished in various other ways?

Mr. BENNETT: We object to a statement of what he has been informed. Confine the question to his own information, if he has any.

Mr. DICKERSON, Jr.: I suppose he knows of his own knowledge, but this witness is called as an expert witness as to the state of the art, and I have asked him with reference to his knowledge of the art.

Mr. BENNETT: But you asked him if somebody has not informed him so and so.

Mr. DICKERSON, Jr.: No; I ask him, "Are you informed," which is quite another and a different thing. I will change
297 the question if you desire. I will strike the question out and ask it over again in this form:

Q. Assume that an apparatus was operative in which a forced circulation was not maintained throughout the entire structure of the chill-room, and that in it perishable articles could be preserved, and that at the same time a substantially equable temperature would likewise be maintained. In what way would that equable temperature be maintained?

A. By natural circulation.

By Mr. CONKLING:

Q. What do you say?

A. By a natural circulation.

Mr. BENNETT:

Q. Would it be a natural circulation in a case where the air passes through a chill-room at the rate of 6,000 cubic feet per minute?

A. If the chill-room was large enough.

Q. You would say that that was a natural circulation?

A. That it was a natural circulation which kept the temperature uniform and distributed the air—not that the force which drew the air in and out of the room was a natural circulation, of course.

Q. Do you not recognize the fact that there is a very great distinction between evaporation and compression?

A. They are totally different things, with no relation to each other at all.

Q. In cooling by evaporation is it not the fact that the
298 latent heat is used in altering the physical condition of the liquid by transforming it into gas?

A. That is quite true, that a certain amount of heat disappears in effecting the transformation of liquid into gas, and that we call the latent heat of evaporation. It is another way of expressing the action which I mentioned awhile ago.

Q. Is not that a very different thing from the simple expansion of air?

A. Not by any means. It is simply a little different kind of expansion. In other words, the present received theory of evaporation is this: A liquid is made of particles which are all in rapid motion, flying around. Above that let us say there is an atmosphere. That is also made up of particles which are flying around. But the particles in the atmosphere are much more sparse and scattered, and are not held together by as strong attractions as the particles in the liquid. But if in the course of the flying around of these particles and their mutual impacts and blows upon each other the particles reach the surface of the liquid at such velocity as to carry it beyond the range of attraction, out it goes, and escapes into the atmosphere above. On the other hand, in consequence of the mutual interference of attraction, a particle will every now and then from the atmosphere above come down upon the surface of the liquid with such velocity that it is carried into that surface and sticks there and stays, so that the evaporation is a very different thing in the
299 two cases—in the one case being the constant introduction of particles in the air, flying off from the surface of the liquid, and in the other the constant introduction of particles from the atmosphere above into the liquid. When the atmosphere is in a saturated condition and has taken up as much of the given evaporation as it will hold it means that these two actions have equalized—as many particles in the given time are caught into the liquid as escape from it into the atmosphere. That is the difference in the action. The manifestation is only a difference in degree as between the action and expansion of a gas, where the particles fly far away from each other or further away than they were before.

Q. In the defendant's apparatus is it not a fact that the entire heat energy is taken out of the compressed air by the work performed?

A. No; it is not so at all. On the contrary, I have already said, the entire heat energy that is taken out of the entire system is taken out by the ocean water and by nothing else. Every other particle of that heat energy remains in that system from the beginning to the end, and would stay there for a century. What is taken out by the piston at that point is reproduced in the compressing of the air.

Q. Understand me in that question to be limiting it to the compressed air at the point where it is about to be introduced into the expansion cylinder, is it not the fact that in defendants' ap-

300 paratus that the entire heat energy is taken up by the work performed in the expansion cylinder?

A. It is substantially true that at that particular point the energy is taken out by the mechanical work and the molecular work performed by the compressed air at that point, but all that is taken out by the mechanical work is put back into the air in the compression cylinder. So far it is a mere interior cycle.

By Mr. CONKLING:

Q. By "molecular work" you mean the attraction or the friction of particles on each other?

A. I mean their separation from each other and their increase in motion—that work which is done by the expanding fluid upon itself.

Q. Acting and reacting?

A. Yes.

Q. You have referred to Tyndall's "Heat as Mode of Motion." I understand that you recognize that as a standard book, do you not?

A. I do.

Q. And one to which you have referred during the course of your examination when inquired about with reference to Tyndall?

A. Yes; that is the one.

Q. You are pretty familiar with it, are you not?

A. I am familiar with the subject, but I have not read that particular book for a good many years.

Q. I suppose the conclusions arrived at in this book are to be relied upon, are they not?

A. Substantially.

301 HENRY MORTON recalled on behalf of the plaintiff.

Direct examination by Mr. DICKERSON, Jr.:

Q. You were asked on your cross-examination somewhat in regard to the state of the art in connection with these compressed-air machines for refrigerating and cooling purposes, and, among others, reference was made to the Gorrie patent, which was at that time not before you. Will you be good enough to make a short explanation of exactly what that apparatus was to the court and in what respect it resembled or differed from the defendant's apparatus in the present case?

A. The Gorrie apparatus, which is shown very well in a perspective drawing, which is Fig. 1, of the patent, consists, in the first place, of a compressing cylinder in which air is compressed, and into that cylinder there was thrown at each stroke a jet of water so as to cool the compressed air or remove some of the heat developed in the act of compression. There is a little pump shown here, which threw at each stroke a jet of ordinary water into the end of the cylinder where the air is being compressed at the moment. Then at the next stroke it threw the water at the other end. The compressed air, mixed with water, then passed out and passed through a worm

or coiled tube, shown in this drawing, surrounded by cold water, where it was further cooled and allowed to deposit the moisture, so that it ran into a large reservoir. From this reservoir, where it had an opportunity to further cool, the compressed air then came
302 out into a cylinder, where it operated as steam does in a steam-engine to give motion, just as in the defendant's apparatus, and the motion which is so produced is made to act upon the same plan so as to aid the compression. In that cylinder there was thrown a liquid by a similar little jet pump, which liquid in that case was an uncongealable liquid, either salt water, brine, or any other convenient uncongealable liquid, which became chilled by being expanded in this way, by doing work, and became very cold, and then the escaping air and chilled water ran into a tank in which were placed boxes in which ice was frozen, or otherwise the mixture of the compressed air and chilled brine were used as cooling agencies. That is substantially the apparatus referred to in this patent.

Q. Will you be good enough to give some explanation in reference to the Siemens publication?

A. This application, No. 2064, of 1857, of George W. Siemens, describes in more general language an apparatus for freezing of for refrigerating by expanding the air or elastic fluid. The air is first compressed by a cylinder or pump, by which its temperature is raised, and it is cooled in the compressed state, and then it is allowed to expand in a cylinder or engine of suitable construction, by which its temperature is lowered. The air thus cooled is brought in contact with the articles to be cooled or frozen and is then conducted through an interchanger or apparatus by which it is made to cool the compressed air which enters the interchanger in the opposite direction. There are further points of description, but that
303 really embodies the whole thing. It is mentioned further along that the air after it expands in the engine "is permitted to pass into a series of tubes immersed in the brine or other fluid;" and he also states that air itself may be used—cold air. "When it is required to supply cold air to a cellar or chamber of any sort the cold expanded air is conducted into such chamber, and in leaving such chamber it passes through the interchanger as before." That embodies, as I understand, the essential features of employing the air to do work and expand and become chilled, and it mentions in another part of the patent that the cylinder in which the air expands is connected with the pump which compresses the air so that the power involved in the expandiing air is used to aid in the apparatus used by the defendants.

Q. I wish you would say, then, in view of those publications, if known equivalents of this apparatus, such as you have described, existed prior to the Kelley patent, to be used in cooling apartments or chambers.

Mr. CONKLING: I object to that, first, as incompetent, and second, not the subject of an opinion to be given in that way by this witness.

Objection overruled; exception.

A. As I understand, the state of the art not only shows that cooling by the use of compressed air was the equivalent of an ice-box in a freezing or cooling apparatus, but that almost every detail, except the very minute points of adjustment of the apparatus, almost every detail of the apparatus as used in the defendant's ap-
304 paratus on the steamship, was known prior to the time of the Kelly patent as the substantial equivalent for an ice-box in an air cooling or refrigerating apparatus.

By the COURT:

Q. Do you say that the mechanical means in the Bell-Coleman apparatus are substantially the same or equivalent to the mechanical means which are used in the Gorrie patent or the Siemens application?

A. Precisely.

Q. That the mechanical means in the Gorrie and Siemens and the Bell-Coleman patent are the same?

A. Yes, sir; that is, in all three the air is compressed, is cooled by water, is allowed to expand, so as to do work, which work is utilized in aiding to compress the air, and the air so cooled is then employed either alone, in one case, or with some brine scattered through it, as a cooling agent to produce cold in another apartment or room.

By the COURT:

Q. The air is first compressed and then expands and is cooled by means of those two operations; but what I wanted to get at is whether the mechanical appliances which are used in the Bell-Coleman patent are the same or equivalent to the mechanical arrangement or appliances which are used in the Gorrie—that is, does the Bell-Coleman infringe the Gorrie?

A. I think it does. They both use the pump to compress and a cylinder, a reversable pump, as it were, for expanding.
305 Both cool the compressed air by the application of water and both use that cooled air as a means of cooling other things.

By Mr. CONKLING: Now, will you give again the date of the Gorrie patent and of the Siemens patent, as to which you have just answered, so that it may all appear on the record?

A. The Gorrie patent is dated May 6th, 1851, and the other is 1857. I don't remember the month.

Q. The month, it seems, is not given.

Cross-examination by Mr. BENNETT:

Q. Using, as you have done to the judge, the word "equivalent," what meaning exactly do you attach to that word?

A. I attach the meaning that that is equivalent which effects the same result by the use of the same means.

Q. And, of course, you now measure your expression?

A. I do; yes, sir.

Q. Producing the same result by the same means?

A. Yes, sir.

Q. And when you use the term "equivalent" you so use it?

A. As I understand.

Q. Thus your answer to the judge, put into one affirmation, if I I understand you, is that Gorrie, and before him Siemens, if that be the name, produced by the same means the same result which Bell-Coleman afterwards produced?

A. As far as the cooling apparatus is concerned.

Q. That is the only thing we are speaking of.

306 A. I mean the compressed-air apparatus as the substitute for an ice-box. Of course, I do not mean the apparatus in a chill-room for taking the air in and drawing it out.

Q. Your answer, then, is that in 1857 Siemens and Gorrie produced by the same means the same result, thereby meaning the reduction of the temperature of air by certain devices?

A. As I understand it, that is just what they did. In other words, what they did in their mechanical substitute for an ice-box was substantially the same thing that Bell and Coleman did—mechanical substitute for an ice-box.

Q. I do not object at all in any personal sense to your putting it that way, but I would like, if I can, to get exactly what you mean without doing it by reference to an ice-box and all that. Now, let me try once more. My question was, omit the ultimate destination and distribution of this air after it has undergone the change to which I refer, do you say that, in 1857, Siemen, and in 1851, Gorrie, by the same means produced the same result of the Bell-Coleman process in so far as reducing the temperature of air went?

A. That is my understanding.

Q. That is what you mean to say?

A. That is what I mean to say.

Q. Does the word "delivered" properly signify this—the condition of the air after the change in temperature has been wrought upon it and before it is delivered finally into the chamber, or whatever it is, to which it is to be conveyed?

Mr. DICKERSON, Jr.: I object to that as immaterial, because I don't understand what it refers to at all.

307 Q. If everything was immaterial that the counsel on the other side does not understand this world would be filled to suffocation with immateriality. I inquire of the Doctor whether the point of time at which he means by his answer to terminate this process of chilling the air would be represented by saying, "Up to the time when the cold air is delivered somewhere else than where it is chilled." I think that must be very apparent to him.

Mr. DICKERSON, Jr.: I have no objection to that.

Q. I think you must understand me, Doctor, don't you?

A. I understand that that part of the process which has been spoken of, and which I have said I consider as equivalent in these old patents and in the Bell-Coleman apparatus—that that part of the operation terminated when the air, for example, passed into the snow-box.

Q. When it was ready to be sent away where they wanted it?

A. Yes, sir.

Q. Or, as I said before, to be delivered where they wanted it?

A. Yes, sir.

Q. When the operation upon the air, so to speak, had been completed—that is what you mean?

A. That is what I mean.

Q. After that, in this Kelly device of which we were speaking, you and I remember that it goes off through pipes which are called T *t*, and therefore before it goes into those pipes the point has been reached where you punctuate your statement?

308 A. Not of necessity In the language of the Kelly patent it goes through the fan blower after it reaches the box and passess into the pipes T *t*. Not that that is material.

Q. Is it, in your opinion, material?

A. No; it depends upon the arrangement of the other parts.

Q. In this case it is entirely immaterial, isn't it—the case that you have been dwelling on in your answers?

Mr. DICKERSON, Jr.: May I ask what is immaterial?

A. The question, as I understand it, is whether it is material or not whether the blower be before or after the ice-box, and, as far as I understand, that is not material, but merely as a matter of fact that in the Kelly apparatus it is so placed.

Q. Since your last examination have you been studying somewhat this question of compressed air and what it is that causes reduction in the temperature where air is compressed and subsequently allowed to expand?

A. Yes, sir; I have looked it over a little more than I had before.

Q. Are you still of the same opinion, in reference to the question of the performance of work by the compression, as on your former examination?

A. I have not materially changed my opinion, but a further investigation has shown me that more of the cooling effect than I at first thought is due to the action in the cylinder, but my

309 original statement that the thing that abstracted the cold from the entire system was the sea water and nothing else remains as it was before.

Q. What is it in the Bell-Colman apparatus, as you understand it, that causes the reduction in temperature?

A. The loss of energy in the compressed air.

Q. In other words, the performance of work is what causes the great reduction of temperature?

A. As I said before, the performance of some work. When absolutely no work is performed there can be no reduction of temperature; that I said before.

Q. Therefore, unless there be performance of work there can be no reduction in temperature of the air?

A. Understanding work in its broadest sense, that is true.

Q. Explain how you understand work in its broadest sense.

A. I mean anything which amounts to the overcoming resistance through space. Thus, for example, if air was let out in this room,

and by that means forced some of the atmosphere of the room out of the windows, that air would be doing work, and to that extent would expend some of its energy and lose its temperature.

Q. Would not that be entirely overcome by the friction of the particles, etc.?

A. No.

Q. Have you in the course of your further investigation satisfied yourself that where the compressed air is allowed to expand into space, only meeting with the resistance of the contained atmosphere in the apartment in which it is permitted to expand, that
310 there is no perceptible reduction in temperature, say, not to exceed one degree?

A. I know that that experiment has been tried, and that allowing the air to escape into an apartment simply does not lower the temperature of the apartment; it lowers the temperature of the vessel from which the air escapes very materially.

Q. That is, the temperature of the apartment into which it is permitted to escape?

A. No; I said not the apartment into which it escapes, but the vessel from which it escapes. The nozzle through which it escapes may become so chilled as to freeze a portion of the moisture in the air as it issues.

Q. Suppose the moisture was not removed, what would be the result?

A. It would depend upon circumstances. If a great deal of moisture is there it will finally clog up the exit valve.

Q. Have you heard of any experiments to determine how long the Bell-Coleman apparatus would operate before it would clog up with snow if the drying pipes were not used?

A. I have not.

Q. What importance do you attach to the drying pipes in the Bell-Coleman process?

A. Either those or such arrangement as is shown in the Gorrie patent for a similar purpose would be necessary, I think, to avoid some trouble in the clogging of the valves.

Q. Then the drying pipes, or means for drying the air, is an essential feature?

311 A. That or something like it. It need not be just that way. It might be a coil, as in the Gorrie.

Q. Do you find in the Gorrie patent or in the Siemens patent or any prior patent known to you an apparatus of the construction and operation of the Bell-Coleman apparatus?

A. The Siemens does not show an apparatus. It only describes it in general terms; but the Gorrie apparatus does show, as I understand, something that is the substantial equivalent—that is, the principal features are there. The differences are only in small matters of detail, which no doubt are considerable improvements, making the apparatus more economical and efficient.

Q. In the Siemens patent are any means described for drying the air?

A. No special means; no.

Q. Then there is, as between Bell-Coleman and the Siemens patent, that distinction?

A. As regards the matter of description, yes.

Q. I believe you have stated that, in your opinion, it would be impossible to long continue the operation of a compressed-air machine that did not provide means for drying the air?

A. That was well known long before and at the time of this Siemens patent. It was well known that rock-drills, if the air used with them was very dry, froze at the exhaust valve.

Q. Is it not the fact that in the case of those rock-drills in the tunnels to which you referred that they were discontinued after a short time, owing to the fact that the air was too cold, and it was impossible to work them successfully?

312 A. They kept right straight on working to the present time. I never heard of their being discontinued. In the Mont Cenis tunnel and in the Hoosac tunnel they continued using them.

Q. You have never heard from reading books describing those tunnels that the use of compressed air as a means for operating a drill was discontinued, owing to the fact that it was so cold?

A. Quite the contrary. My knowledge is that they were not discontinued, but kept on to the last.

Q. In the Siemens patent do you find described anything that resembles the two towers of the Bell-Coleman apparatus?

A. No. I find no such special structure for applying the cooling water.

Q. Then the Bell-Coleman apparatus differs in that respect as well as in the respect of drying the air?

A. Yes; that is one of the details in which it differs. Instead of cooling the air in a general way, in any known way, by an ordinary condenser and the like, which would be understood by the Siemens apparatus, this specific manner is described in the Bell-Coleman.

Q. In the Siemens patent, if I understand you, brine is used in connection with it as a vehicle for conducting off cold?

A. That is one of the means used. The air was used by itself or brine was used. He says both. He says, When a cellar is to be cooled the cold air is driven in.

Q. Do you understand when cold air is used that the use of brine is entirely discontinued?

A. It is not specific. They may both be used, but it rather
313 implies that the air alone is used, in the last paragraph of the document.

Mr. DICKERSON, Jr.: You may have the patent if you want it.

Mr. BENNETT: Oh, yes. (Handing witness the document.)

Mr. CONKLING: Not the patent; you mean that memorandum specification.

The WITNESS: It is a preliminary specification, printed just like the patent.

Mr. CONKLING: There never was a patent.

The WITNESS: Of course, it was only applied for. I should say

that the words here implied that air alone was used. There is no mention of anything else. That is the natural inference.

Q. But do you find anywhere in the patent any description of a change that would permit of the use of air alone without the use of brine?

A. I don't remember any distinct description, but it would not need any. It is perfectly manifest, the air being cold, that you merely had to let it in.

Q. Does not the Siemens publication describe, except as to its last clause, where it says, "Cold air may be introduced into a cellar," the use of brine?

A. It does, as a means of conveying the cold.

Q. Do you find described in this publication anything with reference to what causes the reduction of temperature of the compressed air?

A. Yes, sir; the expansion.

314 Q. Does it make any reference to the performance of work in the expansion cylinder?

A. Not specifically; it merely states that the expansion occurring in the cylinder doing work produces cold, and it does not state anything as to the theory or how the cold is produced.

Q. Then, considering that this publication has no drawing attached to it, it fails to describe, as I understand you, anything that would convey to your mind the towers of the Bell-Coleman apparatus and likewise the means for drying the air?

A. No; I don't mean to say that at all. I mean to say that it would not describe specifically the towers, but would suggest to my mind at once, from the general state of the art at that time, means of drying the air—that is to say, any means of cooling hot air commonly used would be also a means of drying.

Q. You refer to the state of the art as showing means for cooling air in its compressed condition? Refer me to any publication or prior patent that contains such descriptions.

A. There are a great many of them. I will mention one or two: The English patent to Williams, 1853, which is several years before 1857, No. 147, shows a sort of coil—shows an apparatus for compressing air and then passing it through a coil of pipe going up and down in a tank of water.

Q. In connection with a compressed-air apparatus?

A. In connection with a compressed-air apparatus for producing cold.

315 Q. Have you a clear enough recollection as to that patent to state how the cold was produced there?

A. The cold is produced by allowing the air to expand in contact with the object to be cooled and which would have such an effect, but not, I think to a very valuable degree.

Q. There the expanded air then is to come in direct contact with the article to be cooled?

A. Yes, sir.

Q. Is that in cooling apartments as you understand it?

A. In a sort of tank, and the thing to be cooled was the water.

Q. That was an ice machine?

A. That was an ice machine.

Q. This Seimens publication is also called an ice machine, is it not?

A. Primarily, but of course, as it says, the cold air could be used in cellars and so on.

Q. Do you find anything in this publication that says the cold air is to be liberated into the cellar or apartment to be cooled?

A. It implies that it is. It does not specifically say.

Q. Then there is not, even in this publication, any direct statement to that effect?

A. It is not directly stated that the air is to be let free into the room, but it says it may be afterwards passed through the interchanger.

Q. Is not the language of the publication "the cold expanded air is conducted into such chamber, and in leaving the chamber is passed through the interchanger as before?"

A. Yes, sir.

316 Q. Does that imply, to your mind, that the air is to be liberated into a confined apartment and then to be drawn back into the compressor?

A. That is the idea that it conveys to my mind.

Q. Then you have, as I understand you, in this publication a compressed-air apparatus for producing cold, that cold air itself in its expanded condition being introduced into the cooling apartment?

A. It certainly suggests that.

Q. And is then in turn drawn out and returned to the compressing cylinder?

A. Finally to the compressing cylinder.

Q. Then you would have, according to your understanding of this Siemens publication, the continuous use of the same air over and over again in a closed apartment?

A. It would go as far as that.

Q. Do you find means here, then, to make it the full answer to the Kelly patent?

Mr. DICKERSON, Jr.: I am not objecting, sir, but I call your attention to the fact that the witness is Mr. Bennett's and not mine.

Mr. BENNETT: I beg to differ. You have asked this gentleman in reference to this patent. That is the first question that has any bearing on the Kelly patent.

317 A. I do not.

Q. Wherein is it like it?

A. There is no means provided for distributing the cooled air through the apartment to be chilled or cooled.

Q. In other words, it is not the Kelly patent as you understand it, because it lacks the series of distributing pipes T *t*.

A. That certainly is one essential difference.

Q. Are there any other essential differences? And, if so, specify them.

A. That is the only essential differance I can now think of.

Q. If my recollection be correct, you stated on your former examination that it was quite old prior to Kelly's time to use a system of pipes for distributing the air in an apartment to be cooled. Am I correct in so stating?

A. I have no recollection of any such statement as that.

Q. Did not the Vallance patent, to which you referred in your prior examination, make use of a series of distributing pipes?

A. But not in the manner of the Kelly patent.

Q. One thing at a time. Didn't it use distributing pipes?

The WITNESS: It used distributing pipes.

Q. Is not the same true of the Cunningham & Ashley patent, which was prior to the Kelly patent?

A. I do not recall from the name just what that patent is. If you will show me the patent I can tell you. I have exam-

318 ined all those patents, but I do not remember the name.

Mr. DICKERSON, Jr.: I renew my suggestion that this gentleman is their witness and not mine. They are not cross-examining on anything that I have asked him.

A. This patent is to Cunningham & Ashley, 1854, No. 1116.

Q. An English patent?

The WITNESS: An English patent, describing apparatus for ventilating ships, and this patent shows distributing pipes.

Q. You have stated that the Siemens publication suggested to your mind the use of means for drying the air and other similar mechanism so as to make it more clearly resemble the Bell-Coleman patent. Now, it being old in the art to use a series of distributing pipes, would it not likewise suggest to your mind the use of such distributing pipes for distributing air into the cellar or chamber of any sort to be cooled?

Mr. DICKERSON, Jr.: I apprehend that they have not proved that fact, that it was old to use a series of distributing pipes. The witness did not testify to it. You did not ask the witness that question.

Mr. BENNETT: He has just stated that it was so in the Vallance and the Cunningham & Ashley.

Mr. DICKERSON, Jr.: He did not.

319 The COURT: I will admit the question.

A. I have not said that I found in the state of the art certain things which made this patent more nearly approach the Bell-Coleman apparatus, as your question implies, but I have stated that certain things were in use in the art for the purposes indicated in this preliminary specification, which would naturally be used and which, when so used, would make the two apparatuses alike.

Q. Won't you bestow a name on those things as you pass along?

The WITNESS: The cooling—the condensing—apparatus which would serve as a drying apparatus was the one I had chiefly in mind. If this preliminary application stated that the air was to be introduced in the cellar so as to be equally distributed throughou,t

then the state of the art might, perhaps, suggest the use of several orifices or distributing pipes, but in the absence of any such statement in this preliminary specification I do not think that one would be led to use this to simply pass the air into the room through a pipe and take it out again through another.

320 —. That is, if it were one room, you mean?

A. Assuming the cellar to be one room, and if it be two rooms then the pipe, of course, would be carried to each separate room.

Q. That would be two pipes?

A. Two pipes.

Q. So that there would be as many pipes as there were rooms?

A. Yes, sir.

Q. In this Siemens publication do you not find described a series of pipes for conducting off the expanded air, which pipes contain perforations on their under side?

A. I find such an arrangement where the air is passed through brine—the air being made to bubble up through the brine.

Q. Read the words:

The WITNESS: "I cause the air after expanding in the engine to pass into a series of tubes immersed in brine or other fluid. These tubes are perforated on their under side, so that the air passes through the brine in a multitude of streams or bubbles and thus cools the brine, or the air is admitted into a casing surrounding the brine vessels and allowed to pass through perforations in the sides." That is the end of the sentence.

Q. Are not those pipes with the perforations on their under sides for the sole purpose of distributing the air and bringing it in contact with the brine?

A. They are.

Q. Then we do find in this Siemens publication means for

321 distributing the cold air through pipes and letting it out by perforations on the under side, so as to bring it equally in contact with the brine to be cooled?

A. The brine being a vehicle for conveying the cold to the objects *to* which it is intended finally to cool, that is true.

Q. The brine being the refrigerating fluid?

A. Yes, sir; the refrigerating fluid.

Q. In this case the brine is the vehicle for conducting off the cold to the article to be frozen or cooled, you understand?

A. It is.

Q. That cold is conveyed and brought in contact with the vehicle through a series of pipes having perforations on their under sides, as stated in this publication?

A. Yes; if you substitute the words "cold air" for "cold," that is so.

Q. Do you find in this publication any hint or suggestion of dispensing with the tubes with perforations on their under side for distributing the cold air?

A. No specific statement that they are to be omitted, but the

manifest intention is that where the brine is not used that which is a mere means of cooling the brine would, of course, not be used.

Q. Read from this publication that part which warrants you in stating—read any words, if you find any, showing that the brine is to be dispensed with. Please read them all.

322 Mr. DICKERSON, Jr.: The witness has once been examined on that to-day and has read the patent.

A. (Reading:) "When it is required to supply cold air to a cellar or chamber of any sort the cold, expanded air is conducted into such chamber."

Q. Are those the only words to be found in that indicating that brine is ever to be dispensed with?

A. As far as I now recollect, they are.

Q. In the statement which you read from this publication I find the words "the cold, expanded air is conducted into such chamber." What means other than the tubes with perforations on their under sides is described in the publication for conducting the cold air into such chambers?

A. There are no specific means described, but it is manifest that the perforated tubes, which are a part of the brine tank, would certainly not be used to carry the air into the cellar or chamber.

Q. Is not that provided the brine is to be dispensed with? When you say they would not be used do you not mean provided the brine was dispensed with?

A. If the brine was dispensed with still more would they not be used to carry the air into the chamber, because their only use was to carry the air into the brine.

Q. Shall we understand your answer to be that they would not be used, even if the brine was not dispensed with?

323 A. If the brine was not dispensed with they certainly would not be used to carry the air into the chamber.

Q. Is it not necessary, in compliance with this statement that you have quoted, that there be some means for conducting the cold, expanded air into such chamber?

A. Unquestionably; a pipe connected directly with the escape of the air from the expanding cylinder.

Q. What objection would there be to following the exact wording of this publication and using tubes with perforations on their under side for conducting the cold, expanded air into such chamber?

Mr. DICKERSON, Jr.: Objected to as totally immaterial. This is their affirmative defence that these gentlemen are trying to prove by this witness, and of course it is improper.

324 The COURT: The question is a little vague as put.

Mr. BENNETT: I will withdraw the question and put it a little more definitely.

Q. What difficulty would there be in carrying out the language of this patent and using tubes with perforations on their under sides

for conducting the cold, expanded air into such chambers as are desired to be cooled?

Mr. DICKERSON, Jr.: Objected to. The examiner does not ask the question as we suggested.

Mr. BENNETT: I am not asking it as you suggested. I don't propose to try that.

Mr. DICKERSON, Jr.: I don't mean to say as I suggested, but I mean as your learned senior suggested. The gentleman asks, "What objection or difficulty is there in the language of the patent?" He is trying to insinuate that there is some expression in this patent about putting these distributing pipes into the chamber. That is all I am objecting to. If you ask the witness, "Is there anything describing such an arrangement as that?" that is one question.

If you ask, on the other hand, "Is there any mechanical dif-
325 ficulty in doing those things?" that is another thing. But you ask neither one nor the other of those questions, but you say, "What objection or difficulty is there in the language of the patent?" That is utterly immaterial.

Mr. BENNETT: I simply ask Dr. Morton, who has testified in reference to this patent, how it may be used, and what difficulty there would be, in his opinion and from reading this patent and from using that same series of distributing pipes as described in this patent for conducting the cold air into the chamber to be cooled.

The COURT: What mechanical difficulty would there be, if the brine was omitted, in introducing cold air into the chamber through the aperture of the pipes?

Mr. BENNETT: I will accept that question.

Mr. DICKERSON, Jr.: I shall, *pro forma*, object to that as immaterial. I suppose your honor admits it?

The COURT: Yes.

Mr. DICKERSON, Jr.: Exception.

The WITNESS: The mechanical difficulty would be that these pipes with apertures would be at the bottom of the brine tank and nowhere near the chamber to be cooled, and therefore manifestly they would not be a means of introducing cold air to the chamber.

Q. The question is, What mechanical difficulty, if any, would there be in using tubes perforated on the under side for conducting
the cold, expanded air into such chambers as are desired
326 to be cooled?

Mr. DICKERSON, Jr.: Objected to as immaterial.

The COURT: I will admit it.

Mr. DICKERSON, Jr.: Please note an exception.

A. Considering it simply as a mechanical question, entirely aside from anything contained in that patent, I see no mechanical difficulty in attaching such a pipe to the end of the pipe by which the cold air was to be carried into the cellar or chamber and allowing the air to flow out through such pipes or apertures in said chamber.

Q. Would there be any more difficulty mechanically, in your opinion, in doing that than there would be in using one——

327 The stenographer reads the last question.
Mr. DICKERSON, Jr.: Same objection and exception.

A. It would be the addition of a device different in character from the single pipe, and in so far would involve that difficulty, which consists in adding to one device something else.

Q. And that device or addition would consist simply of multiplying the number of openings or putting holes upon the under side of the one pipe, would it not?

A. No; because the natural way would be to carry a pipe as far as the room to be cooled and let it terminate there. Therefore this would be adding another pipe or pipes in the room and making perforations in those pipes so added.

Q. Is there anything in this publication that tells you what is to be the length of the tubes or the size of the perforations upon their under sides?

A. Nothing specifying in feet and inches as to these points, but as they are tubes to be at the bottom of a brine tank they are manifestly small tubes and confined to a small area.

328 Q. This publication ends by the suggestion that "when it is required to supply cold air to a cellar or chamber of any sort the cold expanded air is conducted into such chamber, and leaving the chamber it passes through the interchanger as before." Does that anywhere suggest any mechanical change whatever for accomplishing such purpose?

A. It suggests, of course, the mechanical means which is involved in leaving out the brine tank and everything connected with it, manifestly, and making a direct connection to the chamber to be cooled from the place where the expanded cold air first came into existence.

Q. Do you find any such statement in the publication?

A. I find that plain meaning in the publication. It is not stated in those words.

Q. That is your meaning, I understand, inferred from this statement at the conclusion, which I have just quoted?

A. I think it is the plain meaning of the language there.

Q. Does this specification describe any pipe or pipes for conducting the cold, expanded air from the expansion cylinder other than the tubes perforated on their under sides?

A. I don't remember. It may be that it takes it for granted without describing the connections between the bottom of the brine tank and the expanding cylinder.

Q. It contains, however, a very explicit statement as to how the cold, expanded air is to be conducted from the expansion cylinder and brought in contact with the brine, does it not?

A. I think not.

329 Q. Would you not say that this statement, "These tubes are perforated on their under sides so that the air passes through the brine in a multitude of streams or bubbles and thus cools the brine, or the air is admitted into a casing surround-

ing the brine vessel and allowed to pass through the perforations on the under side," convey such a meaning?

A. It says absolutely nothing as to how the air is to get from the expanding cylinder to the brine tank, but it does describe fully in detail the arrangement of the brine tank and the pipe in it for distributing the air through the brine.

Q. I think you are mistaken in saying that it describes no means for conducting the expanded air from the engine?

A. There are no such means described in the quotation just read by you; there may be elsewhere. I have not the document before me.

Q. I now read from this publication: "I cause the air after expanding into the engine to pass into a series of tubes immersed in brine or other fluid." Is not there a statement which describes means for conducting the cold, expanded air from the engine?

A. No, sir; it is simply said that it is got there. It may go in through a straight tube or crooked tube or in any way. That tank may be in direct connection with the lower end of the cylinder and no tube used.

Q. And you think that is the meaning of the language, "after expanding into the engine to pass into a series of tubes," do you?

330 A. It gets somehow into that series of tubes; I consider it was unnecessary to say how.

Q. You stated a moment ago that according to your understanding of this Siemens publication the only essential difference between it and the Kelly apparatus was the absence of the series of tubes T *t*. Now, assuming a series of tubes with perforations on their under sides to be used for conducting the cold expanded air into such chambers, would you not then have every requirement of the Kelly patent?

A. It seems to me that with the knowledge I now have of the Kelly patent, or what it was intended to do, that this would cover the same ground with that modification.

Q. Is it not the fact that so far as anything contained in this publication is concerned, that you would either have to use a series of tubes with perforations on their under sides for conducting the cold expanded air into the chamber to be cooled, or else supply some mechanical connections that are not described in the publication?

A. I do not think these pipes could be used at all without supplying a great deal in addition; and the choice would be between taking them out of the brine tank, disorganizing entirely that part of the apparatus, and then adding them at the end of the pipe by which the cold air was carried into the cooling chamber and simply attaching that pipe without otherwise disorganizing the apparatus, and not placing a part which was intended for one purpose in another place to serve another purpose.

331 Q. If, however, you were to use a series of tubes perforated on their under sides for conducting the air into the chamber or cellar to be cooled you would be following the language of the patent, while if you used any other mechanical arrangement you would have to go beyond anything described in the patent?

A. No; I should not be in that case following the patent at all, for the patent tells me to use these things in a brine tank. I should then be using them in a cellar. That would be as different as if I should take the governor of a steam-engine and put it on the boiler for a safety valve.

Q. If you were to use one pipe for conducting the expanded air into the chamber or cellar would you be using anything that is described in the patent or publication?

A. I should not be using anything that was specifically described.

Q. Then I understand you that there are no means described in this publication for conducting the cold air into the chamber or cellar?

A. No; that is left to the management of any one endeavoring to do such a thing—as to how they would take it in, by the pipe or conduit.

Q. And he might have taken it by as many pipes as were desirable?

A. There is no suggestion to that effect.

Q. There would be as much authority for doing that as there is for employing one pipe?

332 A. No; because employing one pipe is the usual way of carrying air from one place to another, and a man would never take two unless directed to do so.

Q. Suppose that you had three or four rooms or cellars into which you desired to conduct the air, then you would have to use that many pipes?

A. Manifestly.

Q. And you find a warrant for that in this publication?

A. Unquestionably, in that publication, taking into consideration the state of the art and general knowledge.

Q. And yet, when taken in connection with the same state of the art, you would not be warranted in using a series of tubes with perforations on their under side to introduce the cooled air into the apartment?

A. You would not be instructed to use it. You might use it if you chose; you are not forbidden to do so.

Q. Considering the state of the art to which you have referred, would you not be warranted in using a series of tubes with perforations on the under side for conducting this air into the chamber to be cooled?

A. If you were informed that some result was to be obtained which required such a use.

Q. The Cunningham & Ashley patents do inform you or direct you to use a series of pipes for conducting the cold air into the apartment?

A. Into the various apartments of a vessel—yes.

Q. In the Siemens publication does it not, from the reading of it at length, clearly show that the main object was to use brine

333 in connection with cold expanded air, and as a vehicle for conducting the cold to the articles to be frozen, and not to

use the air itself in direct contact with the articles to be cooled or frozen.

A. That is manifestly the primary idea.

Q. That being so, would it have been possible to use the apparatus described in this publication in connection with the Kelly apparatus?

A. Entirely. In other words, it would have been used precisely in place of the ice-box, and nothing more. We should then have needed the fan of the Kelly apparatus in order to produce a circulation.

Q. You would have needed a fan in that case?

A. Yes.

Q. Would you not also have had to dispense with the use of brine?

A. No; the brine then would have been used in a way common at that time by passing it back and forth through pipes over and through which the air was passed.

Q. And that would have been the equivalent of the Kelly ice-box, would it?

A. It would be equivalent to the Kelly ice-box.

Q. I understand you to testify that if the compressed-air apparatus was used and the expanded air was circulated through a coil of pipes, and the cold air, or rather the air contained in a refrigerating apartment, was caused to pass over those cooled pipes and then in turning to the refrigerating chamber, that that would be the equivalent of the Kelly apparatus?

334 A. As I understand it, that would be the equivalent.

Q. So that if you were to substitute the Siemens apparatus for the Kelly ice-box you would have to bring the air in contact with the cold pipes containing the expanded air, instead of bringing it in contact with the ice itself?

A. That would be the difference. Of course, when I speak of this as the equivalent of the Kelly apparatus I confine myself to its being an equivalent of the ice-box of the Kelly apparatus. That, I presume, is understood.

Q. In addition to that you would have to have also a fan for causing a circulation?

A. Yes; and also the distributing conduits.

Q. Is it your opinion that any means for producing cold is the equivalent of an ice-box for use in connection with the fan and distributing conduits?

A. That is my understanding of it. It is consistent with the use of the other.

Q. Give me the date when you first knew of a compressed-air apparatus being substituted for an ice-box and used in connection with a fan and distributing pipe for causing a circulation of air in an apartment to be cooled.

A. I think my first personal knowledge of this was only four or five years ago, when such an apparatus was used on one of the steamers. I heard of it at that time.

Q. That is one of the Bell-Coleman apparatuses?

A. I think it was.

Q. That is the first personal knowledge that you had of it?

335 A. Of that entire combination.

Q. Now, can you refer me to any publication or patent prior to the date of the Kelly patent where the compressed-air apparatus was used in connection with a fan and conduits leading into a chamber to be cooled and in which the air from the expansion cylinder was introduced by means of these conduits into the apartment to be cooled and came in direct contact with the articles suspended or deposited in that chamber?

Mr. DICKERSON, Jr.: That is objected to as immaterial. He has got a compressed-air apparatus and is forcing the air through with a piston, and then he has a fan on the top of that and operating to force the air through the room. He has an apparatus which is not the apparatus in controversy here and which seems to be entirely immaterial. There is no limit to the examination if we are to go into all those questions.

The COURT: I will admit that.

A. No; I never heard of any such combination.

Q. Can you refer me to any prior publication or patent, prior to the date of the Kelly patent, where a compressed-air apparatus for producing cold was used in combination with conduits or distributing pipes for distributing the air thus cooled into an apartment, the cold air itself being brought into direct contact with the articles contained in the refrigerating apartment proper?

A. I know of no combination which would fulfil all the conditions of your question.

336 Q. Is it not a fact that prior to your knowledge of the use of the Bell-Coleman apparatus on board of steamships in this port that you had no knowledge of the use of a compressed-air machine for producing cold, and the cold air thus produced being introduced into the refrigerating apartment for preserving the articles therein contained?

A. I had no knowledge of such a thing.

Q. Now, in referring to the Gorrie apparatus, will you point out in the Gorrie patents if there are any means which you find there for drying the compressed air?

A. There are two means for that purpose, as I understand, one of them being the coil shown on Fig. 5 by the letter A and the other being the large reservoir B on the same figure.

Q. Do I understand you, then, that you find in this Gorrie patent a means for drying the compressed air before it is expanded?

A. I understand that those two portions of the apparatus would operate in that way.

Q. Is it so described in this patent?

A. No; they are not described as being a drying apparatus, but they so operate.

Q. Then you find in the Gorrie patent no means described for drying the compressed air, such as you find in the Bell-Coleman apparatus?

A. I find an apparatus substantially identical with that of the

Bell-Coleman apparatus for drying the air, but it is not stated to be a drying apparatus.

337 Q. You state, then, that in your opinion with those means which you have pointed out the apparatus would in effect dry the air?

A. They would, substantially, because one of them, called a coil, is the same means; it is a differently shaped coil, but it is a coil, just as the apparatus described in the Bell-Coleman patent for drying is a coil; one is a straight coil and the other is a circular coil.

Q. Would not the moisture in the Gorrie apparatus go on into the expansion cylinder?

A. No; it would settle in the large reservoir, from which it would from time to time be drawn off.

Q. Then, according to your understanding of the Gorrie patent, the air that is introduced into the expansion cylinder is dry air containing no moisture?

A. It is substantially dry air.

Q. Do you mean "dry" in the sense that it is in the Bell-Coleman apparatus?

A. I presume that it would be in very much the same state; that is not dry air, because it deposits snow in the snow-box.

Q. Do you know how much snow it deposits in the course of the day?

A. No.

Q. Suppose in the Gorrie patent there was no means for drying the air in the sense of drying it in the Bell-Coleman apparatus, then you would find in the Gorrie apparatus one of the essential features of the Bell-Coleman apparatus, would you not?

338 A. I should not call it an essential feature. It is a feature which facilitates the operation of the apparatus and saves trouble. It is not a thing, as he made it, without which it could not operate.

Q. Are you prepared to express the opinion that you could operate, for any length of time, the Bell-Coleman apparatus if there was no means presented for drying the compressed air?

A. This is simply a question of degree. If the air was carried in with a greater load of moisture, spray and the like, of course you could not operate it for long. If it was passed through certain intermediate vessels which would allow it to deposit a portion of its moisture, then it could be operated for a considerable time, and it could no doubt be operated longer without any trouble whatever, the dryer it was.

Q. Have you made any experiments to ascertain the condition of the air in the Bell-Coleman apparatus at the time it enters the drying pipe and at the time of leaving the drying pipe?

A. I have never experimented upon that apparatus at all.

Q. In the Gorrie apparatus brine was injected into the expansion cylinder and acted as a vehicle for conveying the cold, was it not?

A. It was.

Q. Do you find any such arrangement as that in the Bell-Coleman apparatus?

A. None.

Q. Would it be possible to use the Gorrie apparatus in connection with and as a substitue for the ice-box in the Kelly apparatus?

A. It would, as I understand it.

339 Q. What would you do with the brine which is injected into the expansion cylinder in the Gorrie apparatus, and which is the only means there described for conveying the cold?

A. I would allow it to convey the cold to any form of apparatus, such as a coil or the like, over which the air could be passed.

Q. Then you would have to substitute some mechanical contrivance which is not shown in the Kelly apparatus in order to substitute a Gorrie apparatus for the Kelly ice-box?

A. I should, of course, in introducing the Gorrie apparatus into the Kelly patent, use something which is not in the Kelly apparatus?

Q. Suppose you substitute the Gorrie apparatus for the Kelly ice-box, and in order to distribute the cold there in the apparatus to be cooled would you not have to distribute and introduce into that apartment the brine?

A. Not at all; I should simply have the Gorrie apparatus in a closed room or box, with the brine—the cold brine—so placed that the air passing over the vessels containing it would get chilled instead of freezing the water, and thus I would cool the air by that cold brine.

Q. Is there any suggestion of that kind in the Gorrie patent?

A. That it should be used in the Kelly apparatus? No.

Q. That it should be used as you have just stated?

A. No; I do not think there is—that it should be used as a means of cooling the air.

Q. Is there any statement in the Gorrie patent that the brine is not to be used in the expansion cylinder?

A. No.

340 Q. Is not that the very foundation, so to speak, of Gorrie's process?

A. It is one of the many characteristic features of that process that the brine is thrown directly into the cylinder, and thereby the brine is more quickly and thoroughly cooled.

Q. And that brine in turn was taken and brought in contact with the articles to be cooled?

A. Oh, no; it was carried into the tanks, and in those tanks were immersed the vessels containing the articles to be cooled.

Q. Then the cold was conducted to those articles by the brine?

A. The cold was conducted a part of its way to the article by the brine.

Q. Now, if you were to take this Gorrie apparatus, arranged and operating as described by Gorrie, and use in connection with it the system of distributing pipes shown in the Kelly patent, would you not be passing through those distributing pipes the brine?

A. No; because no sensible person, in attempting to introduce

this in the Kelly apparatus, would substitute the brine for the circulating air of the Kelly patent.

Q. I am not asking what any sensible person would do, but simply if you were to connect the distributing pipes of the Kelly apparatus with the Gorrie apparatus in order to get cold whether you would not be distributing the brine through those pipes?

A. Yes; if you were so foolish as to squirt ice-cold brine
341 over the carcasses you could, of course, do it.

Q. In the Gorrie patent does he not describe the use of water for the reduction of the temperature of the condensed air?

A. Yes.

Q. Then during that operation the cooling of the condensed air takes away the moisture, does it not?

A. In that regard it is precisely like the Bell-Coleman apparatus.

Q. Can you inform me where you get rid in this patent of that moisture which is there taken up?

A. As I understand it, we first get rid of it in the coil immersed in a vessel of cold water, which on figure 4 is indicated by the letters F P, which is immersed in a tank which, I presume, is indicated by the letter R, and then you get rid of it in the large cylinder D, and from time to time withdraw it from that cylinder to the cock S.

Q. Do I understand you, then, that you find means for drawing off the deposit of moisture?

A. I have not read it carefully through, but I see a stop-cock at at the bottom of the tank, which I have no doubt is for that purpose.

Q. At any stage of the Gorrie process is the condensed air brought in contact with anything that is colder than the water with which it comes in contact during the operation of compression?

A. It comes in contact with the water with the coil cooled by this other water, which may be colder than that with which
342 it comes in contact during the compression.

Q. Is this described in the patent—(*i. e.*), this water which surrounds this coil, as being colder than the water which is injected into the compression cylinder?

A. I do not suppose it is colder than the water at the time it is injected, but it is much cooler than the water after it has absorbed the heat.

Q. Quote from the specification of the Gorrie patent such portion as described that operation, and likewise the condition of the water as to temperature, which surrounds the coil in which you say the drying takes place?

A. In the first place, I will give you in substance the point referred to, and then quote such language as may be necessary. It is stated that to cool the air cold water is injected into the cylinder, and that this water is used over and over again. By this means it would, of course, become somewhat warm. Further on it says that as this injected water has proved inadequate to effect the cooling, the inventor has "superadded a worm, P, immersed in a tub of water, R, through which the air in its transit from the pump A to

the receiver B must pass, and this effectually absorbs the remainder of the heat." This, to my mind, clearly shows that the air comes in contact with a greater degree of cold after leaving the cylinder than while it is in it, and by this cold water, in the tub surrounding the coil, the inventor says the heat is thoroughly abstracted.

343 When that heat is abstracted and the air has had time to repose in the large drum of the receiver the water would be deposited out. That is all the drying it gets in the Bell-Coleman apparatus.

Q. The extent of the drying then would depend entirely upon the temperature of the water surrounding the coil?

A. It would depend partly upon that and partly upon the extent of the surface, and upon the time that the air remained and at the rate at which it passed through the coil, and the time that the air remained in the large reservoir.

Q. Assuming this apparatus to be used on board a vessel at sea and sea water being used, as in the Bell-Coleman apparatus, then the water surrounding that coil would be of the temperature of about, say, sixty-five degrees, would it not?

A. It would.

Q. And then you would get only so much moisture?

A. A deposit of so much moisture.

Q. Out of the air, as is possible from the temperature of 65 degress, surrounding the coil of pipes?

A. That is true.

Q. And whatever moisture then remains would go with the compressed air into the expanded cylinder?

A. It would.

Q. Now, in the Bell-Coleman apparatus, is it not the fact that the coil of pipes, being located in the refrigerating chamber, is reduced to the temperature, or nearly to the temperature, of the room?

A. That would depend entirely upon the rapidity with which the air passed through them, the temperature of the air, and so forth; and it is very certain that the air passing through is

344 not brought to the freezing point, or that part of the apparatus would soon cease to act.

Q. Suppose the temperature of the room in which the coil of drying pipes is located to be 23, what would be the temperature of those pipes?

A. It would depend upon just those conditions that I have stated; but we know positively that if the apparatus is operative the temperature of the air in those pipes cannot fall to the freezing point of water; if it did, they would be choked up right away with ice and snow.

Q. It could fall, however, very nearly to the freezing point?

A. It might, as far as that is concerned.

Q. And it is by reason of that arrangement, the drying pipes in the refrigerating apartment proper of the Bell-Coleman apparatus, that you get such dry air, is it not?

A. That you get dry air at that point of the operation. I might as well explain that it may be that the Bell-Coleman apparatus

would not act unless the air was as dry as that, but that would not apply to the Gorrie apparatus, the injection of brine making it immaterial whether the air was dry or not, as that would prevent freezing the valves.

—. There would be that difference between the Gorrie process and the Bell-Coleman process?

A. Yes; the Bell-Coleman process might need to have the air perfectly dry at that particular point—that is, drier than it would need to be in the Gorrie apparatus.

345 Q. In the Gorrie apparatus, the brine being injected into the compressed cylinder, it is not a matter of much importance as to the dryness of the air which is introduced?

A. It would not be essential as regards the operation of the expansion cylinder and of these valves.

Q. Suppose, as matter of fact, that the Bell-Coleman apparatus when used without the coil drying pipes would clog and become inoperative in a very short space of time, then you would not say that these drying pipes were an essential part of the Bell-Coleman apparatus and process, and in that respect it differed very materially from the Gorrie apparatus?

A. It would be a difference in detail—that is to say, a weakness would have been introduced by this modification which required a special thing to correct it, and, of course, therefore in that apparatus in which the source of weakness had been introduced a corresponding protection must be provided.

By Mr. DICKERSON:

Q. You have been asked about the Vallance and the Cunningham & Ashley patents. In either of these patents, independent of the question how the air is cooled and distributed, is there any method of obtaining an equable distribution of cool air throughout the apartment or space to be cooled?

A. None that I know of.

346 JOHN J. COGER, a witness called on behalf of the plaintiff, being duly sworn, testified as follows:

By Mr. DICKERSON, Jr.:

Q. What was your business between September, 1879, and April, 1883?

A. Ship-joiner.

Q. Did you during that period do any work for Mr. Joseph Eastman?

A. Yes, sir.

Q. Have you seen the model which has been offered in this case as the model of the defendant's apparatus? Had you any connection with it?

A. Yes, sir.

Q. What connection?

A. I made it.

Q. Are you familiar with the wood-work and structures independ-

ent of the metal-work in the boxes used by Mr. Joseph Eastman for the shipping of meat by the forced distribution of air during the period inquired about?

A. Yes, sir.

Mr. CONKLING: Those are the boxes on the ships?

Mr. DICKERSON, Jr.: Yes, sir.

Mr. CONKLING: I object to it, if your honor please. There is no harm in this question, but I object to this evidence now if it goes further.

Mr. DICKERSON, Jr.: The gentleman yesterday suggested that Mr. Eastman was not the owner of these boxes. I do not con-
347 sider it very material, but we propose to prove by this witness that he is the owner of the boxes. I suppose it may be material to be proved.

The COURT: I will admit the evidence.

Q. Did you put in the ships for Mr. Eastman, in which the apparatus corresponded with that in the model there, the wood-work during the period inquired about?

Mr. CONKLING: I object to that.

The COURT: Admitted.

Exception by defendant.

A. Yes, sir.

Q. And to whom did you render your bills for doing this work?

A. Mr. Joseph Eastman.

Q. And by whom were they paid?

A. By Mr. Joseph Eastman.

Q. What were your instructions in regard to the arrangement?

Mr. CONKLING: Will your honor allow me to note an objection and exception to all these answers on this head?

The COURT: Yes.

Q. What were your instructions from Mr. Eastman in regard to the arrangement of the conduits which you placed in these boxes?

A. The original box with compressed air was made on the other side, in Glasgow. The pipes were in the refrigerator when they came here.

Mr. CONKLING:

Q. Won't you repeat that?

The WITNESS: The original refrigerator with the com-
348 pressed air was built at Glasgow. My instructions were to make the boxes that were built here afterwards from that model.

A. And did you so build the boxes used by Mr. Joseph Eastman and all of them during the period that you have named, with the exception of the first box which came over? I refer to the boxes using this compressed air.

Mr. CONKLING: That I object to.

The COURT: That is admitted, and you may note an exception.

A. Yes, sir.

Q. And for what purpose, if you know, were the pipes made longer and shorter and arranged over the top of the room?

Mr. BENNETT: Objected to. He says he merely duplicated the box that came from Scotland. There is nothing to show that this man was told one word as to what offices those pipes were to perform.

Mr. DICKERSON, Jr.: I will withdraw the question. He is your witness.

Cross-examination.

By Mr. BENNETT:

Q. You say the original compressed-air refrigerator came from Glasgow?

A. Yes, sir.

Q. On board of what vessel?

A. I think the Circassia.

349 Q. The Circassia, of the Anchor Line?

A. Yes, sir.

Q. That was a complete apparatus in every respect, wasn't it?

A. It was.

Q. And you have never renewed or fitted over that box, have you? I mean the box that came from Scotland on board the Circassia.

A. Yes; I guess I have, several times.

Q. What have you done to that box?

A. Refitted it after it had steerage passengers on it.

Q. Sometimes they put steerage passengers in those boxes, too, do they?

A. They do.

Q. Do you know who built this original compressed-air apparatus that came over on board the Circassia?

A. I do not.

Q. That was one of the boxes that was used by Mr. Joseph Eastman during the period inquired of in your direct examination, wasn't it?

A. It was.

Q. These other boxes you say you made from a model of the box on board the Circassia?

A. Yes, sir.

Q. Who gave you those instructions?

A. Mr. T. C. Eastman.

Q. You are quite positive about that?

A. I am quite positive.

Q. He gave you instructions to duplicate on the other vessels the boxes of the same construction as the one upon the Circassia?

A. That is my recollection.

Q. Did you ever meet a gentleman by the name of Mr. Cott?

350 A. Mr. Cott?

Q. Yes; from Glasgow.

A. Yes, sir; I think I have.

Q. You remember Mr. Cott?

A. I do.

Q. When did you first meet Mr. Cott and under what circumstances?

A. Your question recalls to me that I have made a misstatement.

Q. I thought so. When did you first meet Mr. Cott?

A. He came over with the fittings of this box—with the machine; the machine was complete and he brought over the conduits, pipes, and the air-boxes along the side, and I put them up under his instructions.

Q. Under Mr. Cott's instructions?

A. Under Mr. Cott's instructions.

Q. And Mr. Cott came over from Glasgow, as you understood at the time?

A. Yes, sir.

Q. Do you know whom he represented?

A. Only by what I have heard.

Q. When Mr. Cott was here didn't he have plans and diagrams showing the arrangement of the pipes and conduits, &c.?

A. He might have had; I did not see them.

Q. And didn't he explain to you the principle upon which he had constructed these boxes or upon which they had been constructed and were to operate?

A. No; he merely told me what to do and I executed it.

Q. How long did Mr. Cott remain here?

A. I do not know.

351 Q. Didn't he remain here for a considerable period of time, and did'nt you, under his instructions, duplicate on other vessels that box that was on the Circassia?

A. I do not think he did.

Q. You would not be positive of that fact, though?

A. No; I would not be positive that he did not stay long enough to tell me the second one, possibly.

Q. The remaining boxes that you placed on board vessels for Mr. Joseph Eastman were duplicates of the first box?

A. Yes, sir.

Q. Didn't you also have drawings and plans furnished you from which to make the boxes?

A. No, sir.

Q. Nothing of that kind?

A. No, sir.

Q. You merely duplicated what was on the Circassia from the inspection of that box and the information that you had received from Mr. Cott?

A. Yes; except so far as the different shape of a different apartment would require me to alter it.

Q. That would depend entirely upon the room in the vessel, would it not?

A. Yes, sir.

Q. You say you rendered your bills to Mr. Joseph Eastmand, and Mr. Joseph Eastman paid you?

A. Yes, sir.

Q. Do you know of anything beyond that, except the mere fact that you received the money through Mr. Joseph Eastman?

A. Nothing, sir.

Q. In these other vessels in which you placed the wood-work were not the compressed-air apparatuses already in place at
352 the time of the arrival of the vessel in this country?

A. In every instance.

Q. Was brought here in the vessel?

A. Yes, sir.

Q. Already piped and — position, so far as the compressed-air machine was concerned?

A. Yes, sir.

Q. Do you know where those apparatuses were placed upon these vessels?

A. Yes, sir.

Q. State to the court where they were placed upon these vessels.

A. They were placed near what is called the No. 3 hatch, on the orlop deck.

Q. You misunderstand me; let us have that, if you please. What was the location?

The WITNESS: Near the No. 3 hatch, in the orlop or steerage deck, except in the steamer Arizona, where, I think, there is one deck above where the cooling-room is.

Q. You speak of one deck above the hurricane or poop deck or main deck?

The WITNESS: No; one deck above the orlop deck.

Q. What I meant to ask you was if you know where these compressed-air apparatuses were placed upon the vessels—at what place, what point—where the vessel was when they were put on?

A. I understood at Glasgow.

353 Q. These were all vessels travelling between the port of New York and Glasgow, weren't they?

A. Glasgow and Liverpool.

Q. Then, I understand you, in every instance the compressed-air apparatus was placed in this position, piped and connected with the machinery, &c., when the vessel reached the port of New York?

A. It was, if you speak of the pipes of the machine; if you mean the wooden distributing pipes, no.

Q. The only work that you did, then, was merely the wood-work?

A. The wood-work.

Q. And that wood-work was duplicating the boxes on board the Circassia?

A. Yes, sir.

Q. Did you ever do anything in connection with these refrigerating apparatuses except merely the carpenter work in connection with the boxes—the frames?

A. That is all.

Q. Did you ever receive any instructions whatever from Joseph Eastman as to how to make those boxes?

A. No, sir.

Q. I understand that this compressed-air apparatus, such as is represented in this model and the large model, which you say you made, was placed on the boat before its arrival in this country?

Mr. DICKERSON, Jr.: I will state that this model has not been offered in evidence by anybody and it does not mean anything in the testimony. I am quite willing that you should offer it if you will.

354 Mr. CONKLING: We do not propose to offer this model now. I do not care whether it is in or out.

Mr. DICKERSON, Jr.: It is not that I desire to have it in. I merely want the record straight, so that we may understand it. When you say "this model" it does not mean anything.

Mr. BENNETT: The question is withdrawn.

Q. I understand you that the entire compressed-air apparatus as appears in this model introduced in evidence by the plaintiff was on the vessel which reached the port of New York.

A. It was.

The COURT: Found where?

Mr. BENNETT: In the location such as shown in this model.

Mr. CONKLING: And where you have described, near hatch 3, under the deck you mentioned?

The WITNESS: Yes.

Q. It was permanently located and ready for operation as soon as the wood-work was completed?

A. I would like to change that figure to 4. When I said
355 hatch 3 I meant hatch 4.

Q. But it was already in position?

A All in position and connected.

By the COURT:

Q. That is, fastened?

A. Yes, sir; secured. I put in this wood-work around here and these beams, and put in these pipes (indicating). I cased the coils, put in the wood-work, made the wooden conduits and distributing pipes, and put them in.

Q. That being all in the apartment, so to speak, where the carcasses were to be hung?

A. Yes, sir.

Q. These drying pipes in the center of the apartment were also located and in position on the arrival of the boat here, were they not?

A. Yes, sir.

Q. And the steam and exhaust pipes and the opening from the expansion cylinders and everything of that character was all arranged and in working order when the boat arrived?

A. Yes, sir.

Q. All you did was to put the mere wooden frame around it and the distributing pipes?

A. Yes, sir; and the insulating spaces.

Q. And that was from the model furnished you from the apparatus on board the Circassia?

A. Yes, sir.

356 Q. Just state how it is that on some occasions this place is used for steerage passengers.

A. If they have more passengers than they can carry in other parts of the ship, they take these boards down, and when they go back they put them up again.

Q. That is, the wood-work?

A. Yes, sir.

Q. The compressed-air apparatus and pipes remaining the same?

A. Yes, sir.

Q. They utilize the space for passengers when they are required to, and just take this wood-work out?

A. Yes, sir.

Q. These compressed-air boxes were operated, I understand you, by Mr. Joseph Eastman, so far as you know?

A. So far as I know.

Q. May I understand you—which way, coming or going, does it occur that the excess of steerage passengers is found—coming this way or going the other?

A. Coming this way.

Q. So that on the occasions when they did that it was from the flux of immigration coming this way?

A. Yes, sir.

Q. And going back the other way——

A. The beef went the other way.

357 Q. Is it not a fact that on some occasions they use this space on the return voyage from Liverpool and Glasgow and New York for steerage passengers without making any very great change in the wood-work—that is, without disturbing the conduits or anything of that kind?

A. I never knew of it.

Q. The shelves are not taken out?

A. The shelves are not removed.

Q. Have you any recollection as to what instructions you received from Mr. Cott when he came over here and put in these boxes or to superintend the putting in of the wood-word on the other vessels?

A. No, sir; I do not think he gave me any instructions for vessels afterwards—not for any vessels that followed after the one that I did.

Q. You understood his special purpose in visiting this country was as the representative of the English owners of these apparatuses and for the purpose of having boxes made on vessels that were at this port?

Mr. DICKERSON, Jr.: I object.

The COURT: If he knows anything about it.

Q. If you know anything about it just please state.
A. He said he came here to instruct us how to do it.

Mr. DICKERSON, Jr.: I object and move that that be stricken out.
The COURT: We do not know yet who Mr. Cott is or who he represents or anything about it.

Mr. CONKLING: But, your honor, that we will show here-
358 after. Of course, we cannot on cross-examination make everything manifest.

Mr. DICKERSON, Jr.: I suggest primarily that all this inquiry is not cross-examination.
The COURT (to the stenographer): Read Mr. Coger's reply.
The stenographer read the last answer as follows:
"He said he came here to instruct us how to do it."
Mr. DICKERSON, Jr.: I will withdraw the objection. I thought he said more than that.

Q. How long did Mr. Cott remain here?
A. I cannot say.
359 Q. Do you know how many Glasgow boats Mr. Eastman was transporting meat upon at that time?
A. All that came to this port.
Q. Wasn't that about five or six?
A. All the Glasgow boats.
Q. In number wasn't it about five or six?
A. About six.
Q. As a matter of fact, didn't Mr. Cott remain here until all the boxes were placed upon all the Glasgow boats?
A. No; he did not.
Q. You are positive about that?
A. I am positive he did not. If he did he did not appear to me there.
Q. How long did he remain?
A. I have a recollection of only one box. If he remained longer I do not recollect it.
Q. He remained and instructed the putting in of one box?
A. Yes, sir.
Q. You have no recollection of his instructing you to put in the other two or three?
A. No, sir.
Q. Did you receive any instructions from Mr. Cott as to who you were to receive your pay from for this work?
A. No, sir.
Q. He did not tell you to whom you were to send your bill?
A. No, sir.
Q. Or where you were to get your money?
A. No, sir; I knew where I was to get my money.
Q. Will you name the vessels that you remember. The
360 Circassia was one. Will you be kind enough to name the other vessels as far as you remember?

A. The Ethiopia, Anchoria, Pavonia; I have forgotten the rest.
Q. You cannot remember any more?
A. I have named four. It is over two years since I worked at that, and I cannot recall.
Q. May I inquire, in the same connection, to what lines these ships belong?
A. The Anchor Line.
Q. All of them?
A. All of them that I have named.
Q. You have named the Arizona?
A. No, sir.
Q. I thought you did before speak of the Arizona?
A. No, sir.
Q. I misunderstood you; I so wrote down here "Arizona." You have said nothing about the Arizona?
A. Oh, yes; I spoke of the Arizona, but I thought that you asked me what ships of the Anchor Line and I named them.
Q. To what line did the Arizona belong?
A. The Williams & Guion line.
Q. Have you any knowledge of Mr. Joseph Eastman or any one else ever having placed the compressed-air apparatus upon a vessel in the port of New York?
A. No, sir.
Q. Then, so far as your knowledge extends, every compressed-air apparatus which Joseph Eastman, the defendant herein, was using, between May, 1879, and October, 1881, was upon the vessel in its position, ready for work, when the vessel reached the
361 port of New York?
A. Yes, sir.
Q. Are you at the present time in the employ of Mr. Joseph Eastman in any way?
A. I regret that I am not.
Q. When did you stop working for him?
A. January, 1883.
Q. You have had no connection with him since that time?
A. No, sir.

Redirect examination.

By Mr. DICKERSON, Jr.:

Q. In your cross-examination you have made some reference to the outside casing of these boxes, the insulation or shell, I think, as you called it; did I understand that you put those in?
A. Yes, sir.
Q. And for whom did you put those shells in?

Mr. CONKLING: I object to that. That is a conclusion of law. I do not object to asking just what took place.
Mr. DICKERSON, Jr.: That is all I mean.
Mr. CONKLING: I object to the inference of the question.
Mr. DICKERSON, Jr.: I have no preference as to the form of the question. You may strike it out.

Q. Who directed you to put those shells in, and who paid you for it?

A. Mr. T. C. Eastman instructed me to put them in and paid me up to January, 1879; after that those that I put in were paid for by Mr. Joseph Eastman.

Q. And those shells that you put in for Mr. Timothy C. Eastman became part of these subsequent boxes?

362 A. Sometimes they did; some of them were there; and sometimes we put in new ones.

Recross-examination.

By Mr. BENNETT:

Q. Can you state any one occasion on any one vessel that you used as a part of the compressed-air box or that you used one of the old boxes that had formerly been used by Mr. T. C. Eastman in connection with the compressed-air apparatus?

A. Yes, sir.

Q. Name the occasion and name the date.

A. The Circassia was one.

Q. I thought you told me that the Circassia came here already fitted up?

A. So she did, but I fitted her.

Q. You fitted her in this port?

A. Yes, sir; with the insulation.

Q. What insulation do you refer to—around the outside of the chamber?

A. Around the outside of the chamber.

Q. The distributing pipes and everything were in position when the Circassia came here?

A. I fitted it up afterwards. They came here already made and were put up.

Q. I want to know whether those are the pipes which he refers to as having been subsequently used when Mr. Joseph Eastman's meat was transported—these same ones that you have been speaking of now in the Circassia?

363 The WITNESS: No, sir.

Q. Then let me understand. I understood you to say that some part of the machine—to call it by a general name—that came in the Circassia was afterwards used for transporting meat for Joseph Eastman. Will you be kind enough to state what you mean by that?

The WITNESS: The shell was used, but the original pipes that came here from Glasgow were metal. Afterwards the metal pipes were condemned and wooden pipes substituted. Those pipes I made.

Q. You have been asked with reference to boxes which T. C. Eastman used prior to 1879. Did Mr. T. C. Eastman prior to 1879 use compressed-air apparatus?

A. No, sir.

Q. Did he use any such arrangement of pipes as you see in that model?

Mr. DICKERSON, Jr.: That I object to.

Mr. BENNETT: You asked him about Mr. T. C. Eastman.

Mr. DICKERSON, Jr.: I did not. If you want a model of the apparatus we will put it in.

Mr. BENNETT: When I want a model I will call for it. When you have got the witness it is your turn.

Mr. DICKERSON, Jr.: Mr. Bennett has no right to ask this witness whether "any such" arrangement of pipes was used there. He can ask, if he pleases, what arrangement of pipes was used by Mr. Eastman, and I will not object to it, and I intend to prove it.

Mr. BENNETT: Just put the question.

364 Mr. DICKERSON, Jr.: No; he will not put the question until the judge allows it.

The stenographer reads the last question as follows:

"Did he use any such arrangement of pipes as you see in that model?"

Mr. CONKLING: I submit that the question is not only proper, but strictly so.

The COURT: Substitute "this."

Q. Did Mr. T. C. Eastman use the arrangement of pipes such as shown in the model of defendant's apparatus now before you?

Mr. DICKERSON, Jr.: I object. It is the same question over again—"such arrangement of pipes."

365 Mr. BENNETT: I said the arrangement of pipes shown in this model.

Mr. DICKERSON, Jr.: Leave out "such" unless the court says so.

Q. Did he use the arrangement of pipes shown here? Q. Did he use the arrangement of pipes shown in the model — defendant's apparatus before you?

A. No, sir.

Redirect examination.

By Mr. DICKERSON, Jr.:

Q. I show you now a model of an apparatus showing distributing pipes within a chill-room. Will you explain in what particular, if any, that model varies from the apparatus used by Mr. Timothy C. Eastman (showing witness a model)?

A. That is the one used by Mr. Timothy C. Eastman—the model marked "Exhibit T. C. Eastman Apparatus."

Q. That shows, I understand, the arrangement of pipes used by Mr. Timothy C. Eastman before the substitution by you of new pipes in the compressed-air apparatus.

A. It does.

Recross-examination.

By Mr. BENNETT:

Q. You say that this model represents the boxes that were used by Mr. T. C. Eastman when he was engaged in the business of transporting meat to Europe?

A. Yes, sir.

Q. In those refrigerators there were ice-boxes, were there not?

366 A. Yes, sir.

Q. One large ice-box to each refrigerator?

A. Yes, sir.

Q. And that ice-box was in the refrigerating apartment, was it not?

A. Yes, sir.

Q. He had also, as this model shows, an opening from the ice-box into the refrigerating compartment proper, had he not?

A. Yes, sir.

Q. And the cold air was introduced at the bottom of the floor?

A. No, sir.

Q. Where was the cold air introduced in Mr. T. C. Eastman's apparatus?

A. It was not introduced at all; it was driven out.

Q. Out from the ice-box?

A. Out from the ice-box. It came out from the bottom of the ice-box.

Q. So that the cold air came out from the bottom of the ice-box into the refrigerating apartment?

A. Yes, sir.

Q. How was the warm air returned or taken back into the ice-box?

A. Drawn in through these pipes (pointing to the upper end of the blue pipes).

Q. Had Mr. T. C. Eastman any arrangement of pipes on the top of the refrigerating apartment?

A. No, sir.

Q. Had he any perforated pipes of any kind?

A. No, sir; one aperature only in the pipes.

Q. In this box used by Mr. Eastman there was also a fan, was there not?

A. Yes, sir.

367 Q. And that fan was located in the refrigerating compartment?

A. Yes; part of it, and part of it came out and was boxed into the hatch. It was meant to be inside. The pulley could come out here. The power was applied to the outside.

Q. The means of conveying power was on the outside, but the fan itself was inside of the compartment?

A. Yes, sir.

Q. When did Mr. T. C. Eastman, so far as you know, commence using such apparatuses?

A. January, 1876.

Q. How long did he continue it?

A. Until July, 1879.

Q. You are certain that Mr. T. C. Eastman continued using boxes such as this model until July, 1879?

A. No, sir.

Q. Tell me how long Mr. T. C. Eastman continued using refrigerating apparatuses such as shown by this model.
A. I cannot tell you.
Q. What style of box did Mr. Eastman use after he discontinued the use of this box?
A. A salt and ice box.
Q. When did he commence using salt and ice?
A. I cannot tell you.
Q. That was what is known as the brine process?
A. Yes, sir.
Q. It had no fan?
A. No fan; no circulation.
Q. He had the apparatus at the sides and ends—a series of pipes through which this liquid passed?
A. Yes, sir.
Q. And the air was caused to circulate by the difference in density?
A. Yes, sir.
Q. And the impurities were deposited on the cold surface of the pipes?

Mr. DICKERSON, Jr.: I object to that unless this witness be shown to be an expert in refrigeration.

368 The COURT: Well, he shook his head, I believe.

Mr. DICKERSON, Jr.: I object to it unless the witness be shown to have any knowledge about it.

Q. Were you ever inside of those brine refrigerators that Mr. Eastman used?
A. Yes, sir.
Q. Did you ever see a white deposit upon the surface of the pipes?
A. Yes, sir.
Q. Frosty like, snowy like?
A. Yes, sir.
Q. That you would notice whenever you went into these compartments and the apparatus was in working order?
A. Yes, sir; coated with frost.
Q. What date did you give when the brine apparatus began?
A. I did not give it.
Q. Can't you get somewhere near?
A. No, sir.
Q. You do, I suppose, understand that it was after the discontinuance of the use of that model?
A. Yes, sir. When that was abandoned, then the salt and brine was used.
Q. And this was never resumed?
A. No.

By Mr. DICKERSON, Jr.:

Q. How long was that first kind of apparatus used?
A. I could not fix the time.
Q. Was it two years?

A. Probably.

369 JOHN J. COGER recalled and further examined.

By Mr. CONKLING:

Q. Have you a correction which you wish to make?

A. Yes. I stated the other day that the first refrigerator which came here was fitted up in Glasgow. Then I was asked, "Do you recollect a Mr. Cott?" and then it occurred to me that the first refrigerator which came here was not fitted up in Glasgow, but was fitted up by direction of Mr. Cott. My first statement was right. The original refrigerator was fitted up in Glasgow, and the second one was fitted up under the direction of Mr. Cott. I wish to make that correction; that is all.

By Mr. DICKERSON:

Q. Can you state, with regard to that first refrigerator to which you have just made reference, whether you were paid for that by Mr. Joseph Eastman, as well as for the rest, or by any one else?

A. The first compressed-air refrigerator I was paid for by Mr. T. C. Eastman.

Q. And for the others by Mr. Joseph Eastman?

A. Yes.

By Mr. BENNETT:

Q. That first compressed-air refrigerating apparatus came over from Scotland, as I understand you to say, on board of the Circassia, in a completed condition?

A. Yes.

Q. Do you not remember that a quantity of meat was brought over in that refrigerator on that first voyage?

A. Yes.

370 Q. What was the condition of that meat? You may also state to the court whether you had a portion of it and what you did with it.

A. Yes; I had some of the meat that came over in that refrigerator—a present from Mr. Eastman—and I dined on it, and it was very good.

Q. Then the first refrigerating apparatus that was constructed in Glasgow brought over on the first voyage a certain amount of mutton?

A. Yes.

Q. And you had a portion of that?

A. Yes.

Q. That apparatus returned on the next voyage of the Circassia and was allowed to remain on the boat thereafter?

A. Yes.

Q. Are you correct in your statement that Mr. T. C. Eastman paid you for putting up the first compressed-air box?

A. Yes.

Q. Is it not the fact that Mr. Eastman only paid you for such repairs as you made upon the apparatus on board the Circassia?

A. I had reference to the Circassia.

Q. You had reference, then, to the apparatus which was placed on board the Circassia in Scotland?

A. Exactly.

Q. And the repairs which you made here?

A. To the extent of $14.

Q. You made $14 worth of repairs to this apparatus on the arrival of the Circassia and while she was in port?

A. Yes; and for which Eastman paid me. I also had a bill of $50 for the machine-room, which was paid by parties in Scotland.

371 By Mr. DICKERSON:

Q. The Mr. Eastman that you refer to is Mr. T. C. Eastman?

A. Yes.

By Mr. BENNETT:

Q. And thereafter — all the work that you did in connection with that compressed-air apparatus your bill was rendered, and the same was paid by Mr. Joseph Eastman?

A. Yes.

Q. And the second apparatus that came over were not the distributing pipes already located on board, and the apparatus simply wanted the outside walls?

A. The pipes came here, and the adjustment was made here under the direction of Mr. Cott, and they were put into position here.

Q. And thereafter is it not the fact that all the work which you did in connection with the Anglo-Glasgow boats was performed under direction of Mr. Cott?

A. No, sir; it was not. My memory does not recall Mr. Cott being here more than on one steamer.

Q. Did you ever receive any directions from Mr. Joseph Eastman as to the construction of these boxes on board of the steamships?

A. No, sir.

Q. After Mr. Cott's departure in every instance where you placed a shell or box on board these various steamships did you not either make it from the model of the box on board the Circassia or from drawings that were furnished you from the other side?

A. I did.

Q. Do you remember of putting the box on board the
372 steamship Galatia, of the London Line?

A. I do not remember it.

Q. Examine this drawing and inform the court if that is a drawing such as was furnished you from Scotland for constructing the boxes on board the various vessels.

A. No, sir; that does not look like the plan that was given to me.

Q. You never built a box from that drawing or from one like it?

A. No, sir.

Q. Examine the drawing and state whether that drawing was fur-

nished you from Glasgow from which to build the box on board one of the European steamships.

Mr. DICKERSON, Jr.: Do you refer to the original drawing?

Mr. BENNETT: Or a drawing like that?

A. No, sir; I did not build one just exactly like that either.

Q. Were you ever furnished with drawings that came from Scotland for the construction of boxes on board these different European steamships?

A. Yes; I recollect two drawings.

Q. State on board what vessel.

A. The first drawing I saw was brought here with the Anchoria, and that drawing would answer for all the other ships of the Glasgow line, and it was not necessary that I should have any other drawing. Afterwards there was a drawing substituted for
373 one of the Guion boats where the compressed-air chamber was on deck above the cooling-room. That required a different plan than if the machine and cooling-room had both been on a level.

Q. And that plan was furnished you from Scotland, as I understand you?

A. Yes.

Q. Do you know whether there was any patent marked or stamped upon any of those compressed-air apparatuses or boxes?

A. Yes.

Q. On all of them?

A. I think there was one on each one.

Q. Examine the plate which I show you and state whether you recognize it; and, if so, where you have seen it before.

A. Yes; that is the stamp that was on all of them.

Q. And came with them?

A. I remember it because I made black walnut pieces to improve the appearance of it.

Q. Do you remember where those plates came from?

A. From Glasgow.

Q. And you put one of those upon each box as the different boxes were completed?

A. On the new shells I put this one, but on the old shells there was one already. Wherever there was not one I put one.

Mr. CONKLING: In connection with the statement of the
374 witness I want to offer this plate in evidence, and I want the record to show these dates, as the plate cannot be very well annexed: "Bell-Coleman refrigerator, dry-air process patents, 15 March, 1877; 1st October, 1878; 22nd January, 1879; 16th October, 1879." With a bracket round them—"Great Britain, 14th September, 1877; 26th March, 1879." With a bracket embracing them—"France, 14th October, 1877; 9th April, 1879; 6th January, 1880; 28th November, 1879." With a bracket round *and*—"14th January, 1877, and 9th April, 1879, Germany." Opposite—"6th January, 1880, Austria; 28th November, 1879, India; 16th April, 1878; 6th April, 1880, United States; 18th December, 1879, Canada; 15th

December, 1879, Victoria; 17th October, 1879, N. S. Wales; 27th January, 1879, Queen's Land; 16th October, 1879, Australia. License No. 16. Chief offices, Glasgow and London." Then there is the mark of the manufacturers who made this plate.

Q. These holes in the plate represent the places where bolts or screws went through which attached them?

A. Yes.

Q. And around that, you say, there was a black walnut frame for ornamentation?

A. That I built.

375 The following testimony taken in the case of The Bate Refrigerating Company *vs.* George A. Toffey *et als.*, pending in the United States circuit court for the district of New Jersey, was then read by the counsel for the complainant under that paragraph of the stipulation made in this case and marked "Exhibit Stipulation," which reads as follows:

"That either party may refer to, read in evidence, use upon the trial of this action the records in the case of The Bate Refrigerating Company *vs.* George A. Toffey *et als.*, in the United States circuit court for the district of New Jersey, with the same force as though taken herein, and the printed briefs and arguments of counsel filed therein, with the understanding, however, that if demanded by the defendants, John J. Bate and Paul H. Bate, witnesses examined in said cause, will be produced for further cross-examination upon their testimony as given in said cause above referred to.

Mr. DICKERSON, Jr.: We are now going to read, under a stipulation, certain testimony taken in the Toffey case, in order to substantiate certain facts. The first which I will read is the testimony of John J. Coger, at page 65.

Mr. BENNETT: Is Mr. Coger in the court-room?

Mr. DICKERSON, Jr.: He is not.

Mr. CONKLING: Will your honor let this be taken subject to our objection without our interposing it all the time?

376 Mr. DICKERSON, Jr.: I should prefer that any objections be made as they should be made—as it is being read.

After stating the name and occupation of the witness the second question is put as follows:

On page 65, folio 269: "Q. Will you please state whether or not you have had any practical experience in the construction of cooling chambers, and generally what your experience is in regard to refrigeration? A. I have constructed some 70 or more cooling-rooms for transporting meat to Europe, and some for the same purpose in abattoirs. I have watched them in operation and seen what they required, and in some cases made alterations in the distribution of air when required."

Mr. CONKLING: I object to this question. I object because the counsel insists upon the objection being made and passed upon and will not allow it to be read subject to objection; therefore I must object now and ask your honor to pass upon the objection.

The COURT: What is the ground of the objection?

Mr. CONKLING: I would like, first, to have the title of the cause appear, which is not as yet on the record. The parties on both sides of the case in which this testimony is alleged to have been taken should be stated, as the objection has something to do with that.

Mr. DICKERSON, Jr.: I will read that. It is the Toffey record. It is the suit of The Bate Refrigerating Company against George A. Toffey, George C. Toffey, Daniel Toffey, John G. Toffey, and
377 William Toffey, being a case decided in New Jersey by his honor Judge Nixon. We have a stipulation that all that testimony is to be read as though taken in this case.

Mr. CONKLING: How is that, Mr. Bennett?

Mr. BENNETT: The stipulation is that you are to consider that testimony precisely as if the witness was in court and gave it, subject, however, to all our objections.

Mr. DICKERSON, Jr.: We will put in the stipulation so that there will be no dispute about it. The testimony, as I understand it, is subject to objection—to all our objections excepting the fact that it is not taken in court.

Mr. BENNETT: Excepting the presence of the witness.

Mr. DICKERSON, Sr.: If it was competent at that time it will be competent in this case.

Mr. DICKERSON, Jr.: I offer in evidence the stipulation made in this case between the attorneys for the parties, and I read the second clause of the agreement.

"Second. That either party may refer to, read in evidence, and use upon the trial of this action the records in the case of the Bate Refrigerating Company *vs.* George A. Toffey *et al.*, in the U. S. circuit court for the district of New Jersey, with the same force as though duly taken in this case."

That is a part of the stipulation which I have read.

Mr. CONKLING: Am I right in understanding now that that stipulation and the whole of it is in evidence?

The COURT: It ought to be in evidence.

Mr. DICKERSON, Jr.: We offer it in evidence.

378 Mr. CONKLING: Then I ask to have it marked as being in evidence.

Mr. CONKLING: Then it is read subject to objection?

Mr. DICKERSON, Jr.: Subject to objection.

Mr. Dickerson then resumed the reading of the deposition of John J. Coger, as follows:

"Q. Will you state whether or not, in the construction of such boxes as are used in transporting fresh meat across the Atlantic, or in similar stationary refrigerating chambers, a forced distribution of air throughout the different parts of the chamber containing the meat is requisite, and what is the experience in the alteration in the distributing conduits to which you referred in your last answer?

379 "A. It is necessary to have an equable distribution of air in all

parts of the cooling-room. The alterations to which I have referred were made to obtain this object, there being portions of the cooling-room in which the circulation of air was not perfect, and in these portions of the cooling-room the meat became mouldy, and after an equable distribution was obtained in these places the meat was delivered in Europe in perfect condition.

"Q. Will you please state whether these chambers were or were not closed to the external air.

"A. They were closed to the external air.

"Q. Can you make a sketch of the alteration to insure equable distribution to which you have referred?

"A. I can, and produce it. This drawing represents a refrigerator in the steamship 'Germanic.' There is a hatch in the center, marked 'hatch.' There are conduits, marked 'A,' leading to
380 a fan-blower, marked 'B,' a conduit from the fan-blower to the ice, marked 'C.' After the air passed on to the ice it escaped again through a long opening, marked 'D,' and passed to the opening or pipes in the conduit, marked 'E.' A portion of this refrigerator at the forward end of the hatch, marked 'G,' was devoid of a circulation of air. It became necessary to put in another conduit, marked 'F,' and more pipe openings, marked '1,' after which a perfect circulation was obtained and meat was delivered in Europe in good condition from this refrigerator.

"Q. Will you state whether, from your experience as a practical man, it is or it is not necessary to the successful transportation of meat in the manner described to have air-distributing conduits extending to the most distant parts of the room for the purposes described in your previous answer.

"A. It is absolutely necessary, and for that reason the conduits and openings in this refrigerator that I have drawn are placed in the extreme end.

"Q. Will you state whether or not that is universally the case in the refrigerators which you have constructed—I mean ocean refrigerators.

"A. It is the case. The conduits and openings for the air have been made to conform to the shape of the apartment to be cooled, and in all cases the conduits have led to the extreme ends of the apartment so cooled.

"Q. Is this also true in regard to stationary refrigerators using forced circulation?

"A. It is true.

"Q. Please look at the model shown you, marked 'Com-
381 plainant's Kelley Model,' and state if that model were shown you as a model of a cooling apparatus to be used in the cooling-chamber of a slaughter-house it would indicate to your mind, as a practical builder of such refrigerators, that it was to be placed in open chamber or in one closed against access of external air, and whether the opinion which you may express is the same as it would have been in 1864.

"A. This is evidently the model of a refrigerator to be used in an

enclosed room, the external air entirely excluded. What my opinion might have been in 1864, it is impossible for me to tell.

"Q. When did you commence to be acquainted with refrigerators?

"A. I built the first refrigerator with a forced circulation of air in February, 1876."

That is the direct examination. If Mr. Bennett desires to introduce the cross-examination he will read it.

Mr. BENNETT: We will introduce that as a part of our case.

382 Mr. CONKLING: Now, I understand that this stipulation is all in evidence.

Mr. DICKERSON, Jr.: Yes; I have offered it, and I will have it marked.

The COURT: These papers ought to be in the custody of

383 the clerk, and have the bundle of papers marked with the title of the case.

Said stipulation is marked "Exhibit Stipulation."

Mr. DICKERSON, Jr.: Next I will read the testimony of Robert Taylor.

"Q. What is your name, age, residence, and occupation?

"A. Robert Taylor; I am 41; I reside at 499 Clinton street, Brooklyn; I am a carpenter and builder.

"Q. Please state what experience you have had in building refrigerating chambers, and about how many you have built.

"A. I have had a large experience in building refrigerators; could not tell the exact number; I could not tell the number over fifty, but about that; the first refrigerator I built was in 1860.

"Q. Please state whether cooling-chambers such as were used in connection with slaughter-houses previous to 1864 were constructed to use outside or confined air.

"A. All ice-house builders at that time, myself included, in building ice-houses, aimed at the entire exclusion of the outside air.

"Q. You mean by ice-houses the cooling chambers to which I have referred in the question?

"A. I do.

"Q. Please state whether you have had any experience in building with models, as, for instance, refrigerator models, and whether from a sufficiently distinct model you could construct a refrigerator.

"A. I have experience in models, and could construct a refrigerator from a model or drawing.

384 "Q. Please look at the model now shown you, and marked 'Complainant's Kelley Model,' and state if that model had been shown you in 1864 with instructions to build from it a practical cooling chamber, whether you would have constructed such chamber to use outside or confined air?

"A. Unquestionably, confined air."

Mr. DICKERSON, Jr.: We will offer in evidence likewise the models produced by Mr. Bennett of the Toffey apparatus, and we agree, I understand, that those are the models of the apparatus there used.

Mr. BENNETT: Those two?

Mr. DICKERSON, Jr.: Yes.

Mr. BENNETT: We admit those as being the Toffey models.

Mr. DICKERSON, Jr.: At page 154 I read the testimony of William H. Lippincott:

"Q. Have you heretofore testified in this case?

"A. Yes, sir.

"Q. Please state whether you recollect——"

Mr. BENNETT: If you will permit me to make our objection now I will object to the competency and materiality of all this testimony. The court has had enough of it read, I suppose, to indicate the line of argument to be advanced.

May it please your honor this testimony which has been read, as your honor will observe, is that given by men who are not experts, who have not had the patents before them, and who have not been called to testify as to the construction of these patents, but
385 they are asked to say how they would use this thing and how they would use that model if it was presented to them. I submit that that is not the question in this action, how they would have used it. There is the patent, and whatever is contained within the boundaries of that patent they are entitled to. Whatever they can get out of that patent they can use against us; but I submit that they cannot call to their aid to help them out of that patent testimony of witnesses as to how they would use that model. The witness Coger, who has been put upon the stand, admitted to your honor that he was not an expert; that he was a mere builder—a ship-joiner—and now they read his testimony as to how he would have used the Kelley apparatus. Does it make the least bit of difference how that apparatus would have been used by others? Suppose that Mr. Kelley in his patent had said that the apparatus was to be used so and so, it would not change the question one iota if they brought ten thousand witnesses here to say that they would use it in a different manner; and yet the only object of this testimony which has been presented to your honor is to try and satisfy you that, although the patent does not contain any such statement, that they can bring to their aid witnesses—the testimony of these witnesses—to show that they would not use it so. If they can do that they might bring here a number of witnesses who have full knowledge of this apparatus as invented by Mr. Kelley, and they might get them to testify by any reference to this apparatus which might be totally separate and distinct from the patent and entirely different, and yet that would not be competent evidence.

386 Mr. CONKLING: You might call ten thousand witnesses to say that they would not do it in that way.

Mr. BENNETT: Yes; to say that they would or would not do it in a particular way. Now, if their patent does contain it that is sufficient. If their patent does not contain it, then I submit that all the witnesses they can call to show how they would have used it will not aid your honor one iota as to the construction of the patent nor permit them to interpolate into it that which is not there; and

therefore we say that all that testimony which they have been reading is totally incompetent. Let me in this connection read you the testimony which has been read here of the witness Goger. Listen to a question put to him and to his answer and you will see that it has no place here: "What my opinion might have been in 1864 it is impossible for me to tell." Now, that witness has not been giving testimony as to how he would have used that in 1864 and prior thereto. He says, "I cannot tell you how I would have used it. I might have used it one way or might have used it another." Now, if there is anything which is well settled it is this, that a witness cannot take a patent of that kind and with the aid of knowledge which he has derived since the date of that patent say, in view of that knowledge, that he would have used it so and so. If that testimony is competent at all it would be competent simply to show what his information was prior to that, and how he would have used it in the light of that information. Then, further on, he says:

387 "Q. When did you commence to be acquainted with refrigerators?

"A. I built the first refrigerator with a forced circulation of air in February, 1876."

There is an acknowledgement that this man had no information or knowledge of this apparatus prior to the year 1876; and, so far as the record appears, he does not appear to have ever seen such an apparatus, much less to have seen it operate, prior to 1876; and yet they read that testimony here and expect it to be taken and accepted upon the question of how that apparatus is to be used.

The COURT: What is your idea of this patent? When you speak of it what do you mean by an "enclosure?"

Mr. BENNETT: I mean an enclosure; to use the apparatus in this room would be to use it in an enclosure, whether the windows were opened or closed. A slaughter-house would be an enclosure, whether it was opened or closed. We say that the apparatus—the air cooling and distributing apparatus—is an air cooling and distributing apparatus, use it where you will and how you will, so long as it is operated in the manner described in the patent.

The COURT: Do those witnesses say anything more than that?

Mr. BENNETT: Yes, sir; I think they do.

Mr. DICKERSON, Jr.: If they do say anything more than that they say more than we shall ever argue to your honor. The other side is laboring under an entire misapprehension of our position in this case.

388 The COURT: What is the meaning, in the opinion of you gentlemen, of the word "enclosure?"

Mr. DICKERSON, Jr.: I think it will facilitate matters if we state the position which we suppose this patent is to occupy.

The COURT: Mr. Bennett has answered my question. I only want you to speak for yourselves.

Mr. BENNETT: If you will permit me to read this question to Coger you will see the extent to which his testimony goes. I read from page 67, interrogatory 9:

"Q. Please look at the model shown you, marked "Complainant's

Kelley Model," and state if that model was shown you as a model of a cooling apparatus to be used in the cooling-chamber of a slaughter-house it would indicate to your mind, as a practical builder of such refrigerators, that it was to be placed in an open chamber or in one closed against access of external air, and whether the opinion which you may express is the same as it would have been in 1864."

The COURT: He says: "This is evidently the model of a refrigerator to be used in an enclosed room, the external air entirely excluded."

Mr. BENNETT: Yes; so that you see that this witness goes somewhat further, and that, too, coupled with the statement that what his opinion might have been in 1864 it is impossible for him to state. Therefore we say that clearly testimony of that character is immaterial and incompetent.

389 The COURT: You may strike out the question and answer 9 in Coger's testimony.

Mr. CONKLING: I move to strike out every question and every answer.

The COURT: Your objection to this testimony was to be taken after Mr. Bennett returned.

The COURT: Does that include all parts of Coger's testimony?

Mr. BENNETT: Yes; it is understood that if we desire to refer to any part of Coger's examination we may do so as part of our case. Now we come to Taylor's deposition.

390 Mr. DICKERSON, Jr.: I want to call attention to the fact that Coger was called upon another point which was material.

391 The COURT: This man Coger is not a scientific expert, but it seems to me that what he says with regard to the better way of constructing chambers is admissible, and also what he says with regard to the operation of the chamber which he made.

Mr. DICKERSON: There is some little confusion as to whether question 8, on page 67, to Coger is stricken out by your honor. There is no possible reason that I can see for striking out the

392 8th question, and I do not understand that it has been.

The COURT: Question 9 is stricken out.

Mr. CONKLING: I submit that question 6 and answer is also clearly inadmissible.

The COURT: That is, that he means that it is the better way to construct refrigerator chambers so as to use confined air.

Mr. CONKLING: And he thinks that that is not a part of the patent nor of the model.

The COURT: This man does not undertake to construe the patent. I do not regard that statement as of the least importance in the construction of the patent. It seems to me that all he says is that he thought, in 1864, that the better way to make a refrigerating chamber was to make it in such a manner as to use in it confined air.

Mr. DICKERSON, Jr.: That is all that we ask to have in. It is only as to the state of the art.

The COURT: I am clear enough that that is admissible.

Mr. DICKERSON, Jr.: Will your honor permit me to read a line

from Judge Nixon's decision? He considers it a matter of very considerable importance.

The COURT: I do not say that the point is of no importance, but I say that what this Mr. Coger said that he thought in 1864 I do not regard as of any great importance.

393 Mr. DICKERSON, Jr.: Of course not.

The COURT: What the construction of the patent is is quite another thing.

Mr. BENNETT: Does your honor permit question 6 to stand?

The COURT: Yes.

Mr. BENNETT: Note an exception to that.

Mr. DICKERSON, Jr.: I am now reading from Lipincott's deposition, page 154:

"Q. How were slaughter-houses constructed in 1864 and prior thereto, in regard to their capacity to be made practically air-tight?

"A. All I can speak of is in reference to my own experience. I superintended the building of two, and they were made perfectly tight; they were brick buildings.

"Q. Do you know of any tightly closed refrigerating chamber made about the year 1864 and used in connection with a slaughtering-house?

"A. Yes; one I built myself, in Tenth avenue near 42nd street, New York city.

"Q. Is it still there?

"A. It is still there."

Mr. CONKLING: I object to that for the very same reason.

394 Mr. DICKERSON, Jr.: I submit, on the contrary, that these gentlemen here are going to urge that the slaughter-houses referred to here were open structures.

Mr. BENNETT: Wait until you hear what we urge.

Mr. DICKERSON, Jr.: I know that very well. It is the old question and the old case. I submit, further, that this witness, on cross-examination, went on to explain that structure, and they have a right to read that.

The COURT: I think that if you want to show that air-tight slaughter-houses were used before 1864 you can.

Mr. DICKERSON, Jr.: That is all.

The COURT: But I do not think that it has very much bearing upon the construction of the patent.

Mr. DICKERSON, Jr.: Perhaps not; but I think it admissible to bring it before your honor, because, as Judge Nixon gave it some weight and refers to it in his decision, I think it is right that your honor should be informed with regard to it.

Mr. BENNETT: Is that all of your case, Mr. Dickerson?

Mr. DICKERSON, Jr.: I desire to read a little more testimony and then to make our offer to prove damages (which I understand will be held over), and that will make our case.

395 Mr. P. H. Bate then read the deposition of John J. Bate, page 2 of complainant's testimony in rebuttal, in the case of

The Bate Refrigerating Company *vs.* George A. Toffey *et al.*, as follows:

"JOHN J. BATE, a witness of lawful age, produced on the part of the complainant, having been by me first duly cautioned and sworn and being examined by Mr. E. N. DICKERSON, Jr., counsel for complainant, deposes and says as follows:

"1 Q. Please state whether or not you are familiar with the construction of cooling chambers for cooling carcasses of meat used in connection with slaughtering establishments about the year 1864 and prior thereto; and, if so, please state whether or not such cooling chambers were customarily open to the external air or were closed chambers.

Mr. CONKLING: That I object to.

Mr. DICKERSON, Jr.: Your honor has previously ruled upon that same question.

The COURT: Yes; I think it is admissible.

Mr. CONKLING: We object to it as incompetent and immaterial and, secondly, because the question is not, whether of science or fact, what customarily was done in slaughtering establishments.

Defendant's counsel except.

"A. I am. I have been engaged in the business of refrigerating carcasses of fresh meat since the year 1845. I have used various methods of cooling for refrigerating meats, and I have also
396 used cooling chambers that were closed against the ingress of the external air. These chambers were insulated by means of filling the walls with some non-conducting material, such as dry sawdust, tan-bark and charcoal, felt, or heavy paper. I have been in many slaughtering establishments between the years 1845 and 1864, and I never knew of any cooling or refrigerating process being carried on unless the chambers or apartments were so arranged as I have described, namely, closed against the access of external air as far as possible by means of non-conducting material in the walls thereof, and I know of no establishment up to the present time wherein carcasses of fresh meat are cooled unless it be in closed chambers."

Mr. CONKLING: I make the same objection to the answer that I made to the question; same exception.

"2 Q. Please state some places where you yourself have so used closed chambers in this connection.

A. I commenced the use of them at St. Louis, Missouri, at my slaughtering establishment, in the year 1847, and from that time up to the year 1854, at which time I came to Brooklyn. In 1854 or 1855 I commenced the use of them at my slaughtering establishment at Brooklyn, and I have constructed for other parties, within their slaughtering establishments, cooling-rooms of the same kind as described—in the slaughtering establishment of Eastman & Martin, of New York; Boynton Packing Company of Boston, Jacob Dold, of Buffalo; Chapin & Company and Dr. Robinson, of Cleve-

land; Charles Davis & Company, of Cincinnati; William
397 Flannigan, of Chicago, and others. The chambers in the slaughtering establishments in which the cooling of meats is done are so arranged that the carcasses of beef or hogs, after they are slaughtered and have hung for an hour or two (until the dripping has ceased), can be pushed upon the beams or carried or hung upon hooks in the cooling apartment."

Mr. CONKLING: To that question and answer I make the same objection.

Mr. Bate also read from page 125 of the same volume the further testimony of John J. Bate, as follows:

"1 Q. Please state whether slaughter-houses in 1864 were constructed to be closed to the outside air."

Mr. CONKLING: Same objection.

"A. They were. They were built in a very substantial manner, of frame, brick, or stone, with doors and windows to be opened or closed at pleasure.

"2 Q. Is that construction true of the houses described by Mr. Boyd Elliot as existing in Mill Creek bottom, Cincinnati, and in St. Louis?"

Mr. CONKLING: That I object to for the same reason.

"A. It is. I visited the slaughtering-houses in Mill Creek bottom in 1855. They were substantial frame buildings, in which thousands of hogs were slaughtered daily during what was known at that time as the packing season, which usually commences about the first of November and continues until the first of March. These houses are provided with windows and doors that were used
398 to shut out the cold air, whenever desired, in order to prevent the freezing of the hogs, which is very damaging to them, because the curing of meat that is frozen or has been frozen is very precarious, and the same fine quality and completion can never be obtained from such meat as can be from meat that has never been frozen. All curers and packers know this, and always require a reduction in the price of frozen hogs as compared with those that have never been frozen. The same is true in regard to the slaughtering establishments in St. Louis. The buildings were generally built two or three stories high, in a very substantial manner. The slaughtering was usually done on the top floor, and the first and second floors were often used for hanging-rooms, where the carcasses could be kept from the filth of the slaughtering floor."

Mr. CONKLING: That answer is objected to for the same reason.

"3 Q. What would be the result, as to using inside air, of placing the Kelley apparatus in such a chamber?"

Mr. CONKLING: That is objected to for the same reason, and also because the witness is not qualified to answer.

Mr. DICKERSON, Jr.: We will withdraw that question.

"4 Q. Can you give a list of such establishments which had closed chill-rooms and ice-boxes in 1864 which you yourself have knowledge of?"

Mr. CONKLING: Objected to for the same reason.

"A. I was not in either St. Louis or Cincinnati during the
399 year 1864, but I can give a list of such establishments as were there prior to that time, some of which are there still:

St. Louis:

Roe & Kercheval.
Levi Ashbrook & Co.
Taylor & Dyson.
Henry Ames & Co.
Whittaker & Palmer.
Joseph J. Bate.
William B. Barber."

Mr. CONKLING: I object to this list specifically for the same reason.

Mr. Bate continued reading the answer as follows:

"These buildings were all brick and stone, with the exception of the Bate and Barber houses, which were of frame and stone.

Cincinnati:

Samuel Davis & Co.
Charles Davis.
Gardner, Phipps & Co.
George Dowerich & Co.
Evans & Kinnett.
J. L. Koch & Co.
The latter two, I think, were since 1864.

Columbus, O.:

In 1854 I had slaughtered for myself 42,000 head of hogs
400 in the slaughtering establishments of Butler, Comstock & Co. and James Jackson. These establishments were substantial frame and brick buildings.

At Louisville, in 1854, the slaughtering-houses of C. C. P. Crosby, Martin, Hamilton & Co., and Hamilton & Ricketts were all substantial buildings such as I have described. In 1860 and subsequently the slaughtering-houses of Charles White & Co., Davis & Atwood, Spring & Haynes, Crane & Sperry, Daniel Feitner, and many others in New York city were brick buildings such as I have described. Later, in Chicago, the slaughtering-houses of Fowler Brothers, Chicago Packing Co., — Armor & Co. were all built substantially, some of them slaughtering as many as 8,000 daily and having cooling-rooms of a capacity as large as 5,000 hogs. The same is true of Kansas City slaughtering establishments, and in Boston the houses of Plankington, Armiur & Oo., John P. Squires & Co., Charles North & Co., and the Boynton Packing Co. The beef butchers of Boston,

almost without an exception, have cooling-rooms in their slaughtering establishments, as it is a rule of the trade there that all of the beef and hogs sold in that market are artificially cooled before being sent to market. Besides the establishments that I have named, there are many others built in the same substantial manner. In the establishments which I have referred to the following used cooling-rooms in connection therewith: Levi Ashbrook & Co., Taylor & Dyson, Henry Ames & Co., Joseph J. Bate, Whittaker & Palmer, Charles Davis & Co., Fowler Brothers, the Chicago Packing Co., Nel-
401 son Morris, Armour & Co., Plankington, Armour & Co., John P. Squires & Co., Charles North & Co., the Boynton Packing Co., and others whose names I do not recollect, and the Boston beef slaughterers in general.

"5 Q. Was there any material difference between the chill-rooms connected with packing-houses and those of slaughtering-houses; and did packing-houses usually have a slaughtering establishment connected with them or in their neighborhood?"

Mr. CONKLING: Same objection.

"A. There was no material difference between them. The cooling-rooms were always constructed with the view of excluding the outside air; and where packing establishments did not have slaughtering facilities on their premises they were usually, if not always, located very near slaughtering establishments, in order to avoid long cartage and the exposure of the carcasses to the natural elements.

"6 Q. This was the case in 1864, was it?"

Mr. CONKLING: Same objection.

"A. It was, and long prior to that time."

Mr. DICKERSON, Jr.: Under the stipulation the defendants have the right to cross-examine Mr. John J. Bate in open court, if they so desire. We have Mr. Bate here in case they desire to cross-examine him.

Mr. BENNETT: Is that all you intend reading?

Mr. DICKERSON, Jr.: That is all we intend reading at present.

402 Mr. CONKLING: If your honor please, we will not stop now to consider whether we want to call Mr. Bate, and if they will go on we will see as soon as we can whether we do or not.

Mr. DICKERSON, Jr.: Mr. Bate may not be here. We shall not send for him. We have an additional patent that we did not have upon the last occasion, which we will offer. We will offer in evidence a copy of the Gorrie patent, about which some inquiry was made. We did not have the full copy previously.

Marked Pl'ff's Ex. Gorrie Patent, May 6th, 1851.

Mr. CONKLING: I object to that patent. I have not seen it. I would like to see it (taking the paper).

Mr. DICKERSON, Jr.: The Gorrie patent was one of those earlier in date than the Kelly patent, showing the use of a mechanism sub-

stantially like that of the defendant's for producing a low temperature by the compression, cooling, and expansion of air, and Dr. Morton was examined about it, calling it by its name, as your honor will recollect, and he did not have the specific document before him. We desire to offer that in evidence.

Mr. CONKLING: To this patent, No. 8080, dated May 6, 1851, for identification, we object as incompetent, immaterial, and irrelevant. I cannot see what it can possibly have to do with the plaintiff's case.

The COURT: That is admitted, and an exception.

Mr. DICKERSON, Jr.: The same disposition of the patent of Mr. Charles William Seimans, relating to the same subject.

403 Mr. CONKLING: We will look at that if your honor will allow us (taking the paper). This paper which I find in the hands of the stenographer is a bit of manuscript without a bit of authentication or preface of any kind, except A. D. 1857, No. 2064, received provisionally, &c.

Mr. DICKERSON, Jr.: It is a copy of a provisional specification. Under our arrangement with Mr. Bennett we can offer copies, subject to correction.

The COURT: This never went to a patent?

Mr. DICKERSON, Jr.: No, sir; it never went to a patent. It merely comes into this case as a publication and not a patent.

404 The COURT: Is it a printed publication?

Mr. DICKERSON, Jr.: A printed publication in the English Patent Office Reports. It is a regular copy.

The COURT: I will receive it.

Mr. CONKLING: I object to it as incompetent and immaterial.

405 The COURT: Call your next witness.

Mr. DICKERSON, Jr.: I understand that the question of damages is reserved for a master.

The COURT: What I mean to say is this: that if it becomes necessary to have an accounting for damages——

Mr. CONKLING: Or for profits.

The COURT: Then I see that it will be a long accounting necessarily, and that it must be done by a reference; but I do not decide that it will be necessary. The question of the accounting depends upon the infringement of the patent—that is, whether this device is an infringement of the other device.

Mr. DICKERSON, Jr.: So we understand it. Whether we shall or shall not have an accounting is a thing in the future.

Mr. CONKLING: I understand that our objection to proving profits as a measure or element of damages is sustained.

The COURT: It is *pro forma* sustained.

Mr. DICKERSON, Jr.: And I suppose we had better have a *pro forma* exception?

The COURT: Yes.

Mr. DICKERSON, Jr.: Our *prima facie* case is now complete, subject to the offer on the question of damages. We offer to produce evidence upon that question, showing, first, the market value of the improvement; secondly, an established license fee; and, thirdly, the

profits which the defendant has realized, the latter being one of the elements upon which damages may be computed.

406 The COURT: As to the profits, I believe that I ruled that out.

Mr. DICKERSON, Jr.: Your honor has made a *pro forma* ruling on that question.

The COURT: I will reject the evidence with regard to profits *pro forma* and admit all the other evidence. I will consider that evidence as in, but to be the subject of a reference in case it becomes necessary to refer the question of damages or profits. With that understanding your case is closed?

Mr. DICKERSON, Jr.: Yes.

407 The COURT: Will you now go on with the testimony in the ordinary way, or make a motion?

Mr. CONKLING: We want to put in, as we have a right to do, a bit or two of mere documentary evidence—very brief—in order to raise our question. For example, as we should have insisted, we had a right to put that plate in if we had not gotten the facts about it from a witness. We wish to put in a brief record or two in order to establish formally a fact, and then we propose to make our motion, which will be to the effect that for, not many, but certainly three or four, separate reasons, which we will try to be able to state briefly, this action cannot be maintained, and, to be quite explicit, that if it could be maintained at all, then it could not be maintained for anything beyond nominal damages.

The COURT: Do you propose to make that motion upon the

408 evidence already in or upon the assumption that it is fairly deducible therefrom that there was no infringement of the fifth claim?

Mr. CONKLING: I do.

409 The COURT: Has Professor Morton told, exactly or in substance, what the gentlemen upon your side would say (with perhaps a marked exception) that the two patents spoken of this afternoon anticipated, mechanically, the Kelley patent?

Mr. CONKLING: No, sir; on the contrary. If your honor ask me the question I will answer frankly. If you come to a statement of what we understand to have been the state of the art, what we understand to have been, scientifically, if I may say so, the facts from time to time, you will find between Professor Morton (whose clearness of statement is unmistakable) and the other gentlemen—some of whom have given a great deal of attention to this subject—not only discrepancies but contrarieties of understanding, which will be somewhat radical and formidable in their effects.

The COURT: I did not know but that you might think that on the matter, with the exception of the bias naturally entertained by a witness called on one side, you had got out of Professor Morton a statement of your own case.

Mr. CONKLING: Oh, no. We think that we have got enough to warrant us in saying something in reply; but when it comes to be a matter of fact to be ascertained, then I think you will hear several gentlemen who will speak here in contradiction of his state-

ments, and there will be committed to you several questions as to which is right in theory and practice.

410 Mr. DICKERSON, Jr.: It is suggested that there is to be a motion here in substance to dismiss after the proofs have been put in by defendants. I want to put in a pin right here, and say that I will object to that. If they are going to make any such motion as that it must be upon our evidence, and not upon anything that they are proposing to introduce. Of course, as at present advised, I do not yet know what they want to put in. If it is a matter of material defense, naturally I shall object to such motion being made after their evidence is put in.

The COURT: I judge that the safer way would be to make the motion without putting in any evidence.

Mr. CONKLING: We have no evidence to put in, unless it is some formal proof. We do not want to do anything except to do what the Supreme Court say that we may do on the trial.

411 The COURT: It is manifest if we stop to take the evidence as offered *seriatim* that it is going to be a very long operation. Why not argue the two remaining questions or the three remaining questions? Why not make your motion upon those points irrespective of damages? I regard the bottom question in this case as the construction of the fifth claim, whether the fifth claim does include structures like these.

Mr. CONKLING: I don't know but the suggestion your honor makes is the wisest one on which we could act.

The COURT: We want to have this so presented that the Supreme Court will be able to understand what the thing is, that when it gets there it may get there properly.

Mr. DICKERSON, Jr.: Your honor's suggestion meets our view entirely.

412 Mr. CONKLING: We differ in recollection a little. I understand the plaintiff to have rested.

Mr. DICKERSON, Jr.: I am not quite sure, sir. There is one point I see, Mr. Bennett, that is not quite clear in the stipulation, namely, that these apparatuses are put in use here at the dock and are used from that period on in these ships. I suppose it is included in the stipulation.

Mr. BENNETT: The stipulation clearly says what is the fact, that these apparatuses are used simply on board European steamships. They are, of course, put in use when the box is closed and the ship is about leaving the port, and, until the ship arrives, outside the jurisdiction of the court, undoubtedly; and we desire the court to distinctly understand that at all times, so far as the controversies here are concerned, these apparatuses were placed upon and used only on European vessels.

413 The COURT: The idea is that the use of the apparatus commences in the vessel as it lies at the wharf and within
414 the port of New York and not outside of Sandy Hook.

Mr. CONKLING: It must be so, of course.

Mr. DICKERSON, Jr.: That is all, sir.

415 Mr. CONKLING: If your honor pleases, there has been be-

tween my associate and myself and one or two spectators of this trial a little discrepancy of recollection which, not having been permitted to see the testimony, I could not ascertain the right of by the record, as to whether the original Kelly patent, which was handled here and seen in court, was formally put in or not. For abundant caution, as it is here, I want it deemed in evidence. My impression is that it is in. I want it in, and, to make quite sure of that, we will put it in now.

416 Mr. DICKERSON, Jr.: I shall object. In the first place, let us get this other matter settled. What we say is this: Before the steamship leaves the wharf, being tied to the wharf, the meat is put in the refrigerator, the refrigerator is closed, and the refrigerating operation commences by putting that apparatus into operation to cool and chill that meat.

The COURT: Obviously they could not put them on board outside of Sandy Hook, on the high seas. They could do it, but it would be impracticable.

Mr. CONKLING: There is no such pretense at all.

Mr. DICKERSON, Jr.: That is not the question exactly. They could put the meat into the refrigerator, leave it open, and not operate the apparatus until they got outside of Sandy Hook. Of course, they could not do it practically, but legally they might do it. That principle, I understand, is covered by the admission. If your honor does not so understand, we want to call a witness.

The COURT: I do understand it so. I could not understand it any other way. I can't vouch for anybody's else understanding, but I understand that the meat is put on board at the wharf, and the operation of the refrigerating apparatus then commences, and continues, or is supposed to continue, until it reaches the destination.

Mr. DICKERSON, Jr.: That is the fact, and if your honor understands that from the admission of counsel, that settles the question. If not, we desire to call a witness upon it. As to the other point, of course we object to their offering the original of this patent now. That is an affirmative defense. When they come to make their case they may call witnesses to show that the reissue is totally different from the original.

417 Mr. BENNETT: You would hardly think that that was competent, would you?

Mr. DICKERSON, Jr.: I hardly think you would. Perhaps you might. There is no telling what you would do. At any rate, that is an affirmative defence and cannot be put in to enable these gentlemen to found an argument upon it to dismiss. I think that is very plain.

Mr. CONKLING: It would be, if your honor please, if the court had not invariably said the other way.

The COURT: The point is this: You may go to the supreme court upon an error. The point is this: In case you offer in evidence something after the plaintiff has rested, whether you can then safely make a motion that judgment be entered for the defendant upon the ground that the plaintiff has not made out his case.

Mr. CONKLING: In the first place, immemorially, the defendant

always had a right to put in paper evidence which proved itself to raise a question.

The COURT: If you are ready to take the responsibility——

Mr. CONKLING: I am quite ready, your honor, and all the more so because in the case of the Turkish government, which was heard before your honor and in which the supreme court went quite at large over all this doctrine, they took particular pains to say that at any stage of the trial, the defendant having put in anything which raised a question of itself, it was right and proper to stop and then consider, not a motion for a nonsuit, which was unknown
418 to the common law and which grew up under the statutes, but, as your honor has said, a motion to dismiss the complaint, or a motion that the court direct the jury to find upon that. So you put in a release in an ejectment suit; you put in a deed that shows title out of the plaintiff, and there the question arises and there you raise it. I am quite willing to take the whole responsibility and I beg to be allowed to take it. That is the original patent. I supposed that it was in and I think it is now.

The COURT: With that understanding, of course there is no objection to putting in the original patent as matter of defence.

Mr. DICKERSON, Jr.: None whatever.

Mr. CONKLING: As matter of defence, which defence will be merely to enable you to construe the questions which arise on that patent; that is all we want—simply to see whether their claim is good or bad.

Now, I want also to put in and I offer in evidence the English patent No. 1030, dated March 15th, 1877, entitled "Specification of Henry Bell, James Bell, and Joseph James Coleman, refrigerating process and apparatus for preserving food." This patent covers the device in the model which your honor has before you.

The only other bit of evidence which I believe that I wish to put in is a decree made between these identical parties, The Bate Refrigerating Company, complainant, *vs.* Joseph Eastman, de-
419 fendant, in the circuit court of the U. S. for the southern district of New York, at a term of the court held at the U. S. court-room, in the city of New York, on the 7th day of March, 1884:

"A motion having been made by the defendant to dismiss the bill of complaint in the above-entitled suit for want of prosecution, and a motion having been made by the complainant for an attachment to issue against the defendant for contempt, and a motion having also been made by the complainant for an extension of time within which to prove its *prima facie* case, and a motion having been made by the defendant to strike out the testimony taken by the complainant, and—

"All of said motions having been argued by Edward N. Dickerson, Jr., Esq., in behalf of the complainant, and by Livingston Gifford and John R. Bennett, Esqs., in behalf of the defendant, it is hereby ordered, adjudged, and decreed as follows:

"1st. That the above-entitled suit be, and the same is hereby, dismissed without costs to either party.

"2nd. That the motion for an attachment to issue against said defendant for contempt be, and the same is hereby, denied.

"3rd. That the motion for an extension of time in which for the complainant to prove its *prima facie* case be, and the same is hereby, denied.

"4th. That the testimony heretofore taken on the part of the complainant be, and the same is hereby, stricken out.

"(Signed) WM. J. WALLACE."

I ought to remind your honor that you have had put in
420 evidence before you in this case proof of what had been done in the case in which this decree was made, proof to the effect that an injunction had been issued, and so on and so on. We offer this in evidence with the statement, which I suppose it is unnecessary to make, which I will make, however, in order to be entirely frank, that this being a suit between those parties upon this identical patent and claim for this very infringement during this very time, it is an estoppel. It would be, as I understand it, if only they could have tried this issue here, but more absolutely and unmistakably when the very gravamen and body of the cause of action there was the cause of action here. And therefore we say, when we come to make our motion, that assuming everything else to be with the plaintiff, abandoning every other ground, that here is a decree which has never been appealed from, which stands unreversed and unmodified, between those very parties, making a final adjudication in this very matter, in all its length and breadth, and with no possibility surviving to the plaintiffs, except as the fact was not, but as they might have done had the fact been the reverse, to sue for any infringement which took place after the rendition of this decree. Everything before was either disposed of by the statute of limitations or it fell within the scope of this adjudication. If you will have this marked as being in evidence——

Mr. DICKERSON, Jr.: I guess not, until we object. The learned
421 counsel offers a thing in evidence and then goes on and argues about it and asks to have it marked without giving us any opportunity to object to its admission. We object to it as immaterial and incompetent. In the first place, if it be an estoppel, an estoppel must be pleaded. The estoppel is not pleaded. In the second place, it is covered by the decisions of the circuit court and of the Supreme Court of the U. S. as not being an estoppel. There are plenty of those cases. We object to the offer on both grounds, as not being pleaded if it be an estoppel, and in the second place as being immaterial and incompetent. I suppose it is hardly necessary to go beyond the first point. It is perfectly well settled that anything in the nature of an estoppel to a suit must be pleaded. If your honor desires any citations or authorities on that proposition of law there are many, and I have some here. I can cite the case of Greely *vs.* Smith (1 Woodbury & Minot, 181) and the same case at page 237. I can also cite the case lately decided by Judge Wallace, in which he gave me the same construction in a way that I remember. It is a case which will come up before your honor in

another aspect shortly—one of the Tooth Crown cases, where I have endeavored to substantiate an estoppel by an agreement between the parties not to test the validity of the patent, and his honor decided that that could not be shown unless it were pleaded. I refer to the case of the International Tooth Crown Company against Muller and Berkowitz. In regard to the second point, there are many cases.

Mr. CONKLING: May I ask where that authority is that an estoppel must be pleaded?

422 Mr. DICKERSON, Jr.: I can give you that in a few moments. It is reported, I think, in the Federal Reporter. The clerk will get it in a moment.

Here is a decision upon the other question which seems to be conclusive. Hughes *v.* The United States (4 Wallace, 232). I quote from Mr. Justice Field's decision:

"In order that a judgment may constitute a bar to another suit it must be rendered between the same parties or their privies, and the point in controversy must be the same in both cases and must be determined on its merits. If the first suit was dismissed for defect of pleadings or parties or misconception of the form of proceeding or want of jurisdiction, or was disposed of on any ground which did not go to the merits of the action, the judgment rendered will prove no bar to another suit."

The case of Allen *v.* Hunt (2 Woodbury and Minot, 121, 133) is also in point. Judge Woodbury said:

"Dismissing bills is sometimes done for want of prosecution, and is then like a nonsuit in a court of law, which is, of course, no bar nor competent evidence to affect a subsequent suit."

I suppose that unless my learned friends can reverse those decisions there is no need of my citing further authorities.

Mr. CONKLING: I suppose it is premature to discuss the effect of this estoppel, if estoppel it be, and therefore I shall be very

423 brief. The first objection made to this evidence is, perhaps, the best, that it is not pleaded; but how far that objection is good will appear from what I read to your honor from the notice of special matter.

"Fourth. That the plaintiff herein, on or about the first day of March, 1881, filed its bill of complaint in the court against the defendant herein for alleged infringement of said reissue of letters patent No. 7643, to which answer was filed and replication made, and that subsequently and on or about the 7th day of March, 1884, said bill of complaint was dismissed by order of the court, as follows:

"It is ordered, adjudged, and decreed that the above-entitled suit be, and the same is hereby, dismissed without costs to either party, by reason whereof the questions at issue in that cause became, as between the parties, *res adjudicata*, and consequently the plaintiff herein is estopped from making any claim as against this defendant for any act permitted prior to the first day of March, 1881."

As I did not draw this, it will not be immodest for me to say that I think that is a pretty good setting up of an estoppel. It is a good deal more particular than it need to have been under the most

stringent rules. Doubtless the counsel has overlooked the fact that it was formally pleaded. I will not trouble your honor with commenting upon the authorities. What effect the evidence will have we will consider in due time. Certainly we are quite right in offering this decree.

Mr. DICKERSON, Jr.: The counsel is right in saying that
424 that has not been called to my attention. I have not seen the notice of special matter, but I have looked at the pleadings, and I doubt whether this estoppel comes in under the notice of special matter. It seems to me it should be made a pleading in chief and not a special matter, which is pointed out in the statute specially to be pleaded in that way.

Mr. CONKLING: The only difficulty about that is that the act of 1870 expressly makes this one of the things to be specially pleaded.

Mr. DICKERSON, Jr.: I have not the statute before me and so I speak with some hesitation.

The COURT: The legal effect can be discussed in the course of the argument.

Mr. DICKERSON, Jr.: Your honor will be good enough to give us an exception.

Said decree is marked in evidence.

425 Counsel for the defendant then moved the court as follows:

Mr. BENNETT: I think that we are now in a condition to make the motion intimated to your honor yesterday.

Our motion, to put it in proper form, is that your honor instruct the jury to find a verdict for the defendant upon the case as made out by the plaintiff, and for these reasons:

First. That the defendant in this action, while engaged in the business of transporting meat to Europe from the port of New York, used, upon European steamships properly registered under the laws of Great Britain and sailing, under the British flag, between the ports of New York and Liverpool, refrigerating apparatuses known as the "Bell-Coleman refrigerating dry-air process," said apparatuses belonging to the Bell-Coleman Association of Glasgow, Scotland, and were placed upon the vessels while at the port of Glasgow, and that the use of such apparatuses by the defendant was only upon such vessels and under license from the owners of the apparatuses, who had placed them on board of the English ships under and in accordance with letters patent granted to them by the Kingdom of Great Britain, and that such use by the defendant does not constitute an infringement or violation of the patent laws of the United States.

Second. That the refrigerating apparatuses used by the defendant do not infringe the fifth claim of the reissued Kelly patent number 7643.

426 Third. That, in view of the admitted state of the art and as disclosed by the plaintiff's testimony, the fifth claim of the Kelly reissue is not for a patentable combination or invention, and hence is void.

Fourth. That if the construction given to the patent and the Seaman specification by plaintiff's witness, Dr. Morton, be correct and show known substitutes for the Kelly ice-box, the fifth claim of the reissued Kelly patent is anticipated.

Fifth. That the fifth claim of the Kelly patent, as construed by the plaintiff's witnesses, is invalid, as not being for the same invention as that claimed in and by the original Kelly patent, and was not warranted by the original claim.

Sixth. That this action cannot be maintained, nor can any recovery be had as against this defendant by reason of the former decree of this court dismissing the bill of complaint in a suit on the equity side of the court between the same parties.

Mr. DICKERSON, Jr.: I desire again, sir, to renew my objection to the offer of that supposed decree affecting this action.

427 And thereafter, on the 12th day of June, 1885, after having heard the defendant's counsel in support of his motion and the counsel for the plaintiff in opposition thereto and the counsel for the defendant in reply, the court rendered its decision as follows:

"The COURT: This is an action at law to recover damages for the alleged infringement by the defendant, in the port of New York, of the fifth claim of the reissued letters patent 7643, issued to Moses J. Kelly, April 24th, 1877, for an improvement in air cooling and distributing apparatus. The original patent, No. 44731, dated October 18, 1864, and antedated October 6th, 1864, was assigned to the plaintiff on December 21st, 1876. By written stipulation between the parties a jury was waived, and the action has been tried by
428 the court. After the plaintiff had rested his case, and after the introduction by the defendant of two patents, and a decree or order of the circuit court for this district dismissing the bill in equity of the present plaintiff against the present defendant praying for an injunction against the infringement of the reissued letters patent which are the subject of this action, the defendant moved that judgment be entered for the defendant, upon the ground that upon the facts as presented the action could not be maintained. The only question which I shall consider is whether the fifth claim, properly construed, includes the apparatus which is admitted to have been employed and used by the defendant on board an English vessel in the port of New York, between the dates stated in the complaint, in the manner stated in the written stipulation. The patentee states in the specification of the reissue, and also of the original patent, that his air-cooling apparatus was for cooling carcasses where hung to cool in slaughtering establishments, cooling halls, railroad cars, grain bins, the holds of vessels, and other places and apartments in which it may be desired to reduce the temperature of the atmosphere by the introduction of cool or cold air. In the description of the construction and operation of the apparatus the patentee described with particularity two forms of chests or receptacles for ice. Certain portions of one form of one box are to be filled with ice, and the other form of box is to be kept full of ice or nearly so. The air which enters an aperture in the lower

portion of the ice-box is cooled by passing through or
429 over the ice in the compartment. Over the ice-box are placed what are styled common fanners within an air-tight casing or otherwise directly connected with a pipe which conducts the cold air from the ice-box, so that the fanner being put in motion by a belt on a pulley or otherwise, all the air they move is drawn through this pipe. Leading from the fanners overhead in slaughtering establishments is a large pipe, tube, or conductor; smaller pipes lead from this tube immediately over each row of carcasses, and in these small pipes are openings from which currents of air issue upon each carcass as may be desired. The ice being arranged in either of the two described ice-boxes, or in a described ice-house in the manner detailed in the patent, and the fanners put in rapid motion, a portion of the air is rapidly cooled and forced through the pipe P (the pipe connected with the fanner) into any place or apartment to be cooled, and there distributed through and from a sufficient number of small perforated tubes so as to properly equalize or equally distribute the air thus introduced.

The five claims of the reissued patent are as follows—I will only read the fifth and second:

"1 [2]. In an air-cooler or apparatus for cooling carcasses, &c., the combination of a fan-blower or its equivalent, an ice-chest or equivalent, and one or more pipes or conduits which equally distribute the air within the place or apartment to be cooled, substantially as and for the purpose herein set forth."

430 "5. In an air-cooler or apparatus for cooling carcasses, &c., the combination of the fan-blower or fanners F, the system of tubes T *t t*, &c., and the ice chest or depository in either of said forms, as and for the purpose shown and represented."

The fifth claim is substantially like the single claim of the original patent. The apparatus which is claimed to infringe the Kelly patent is described in letters patent to Joseph J. Coleman, No. 226,281, dated April 6th, 1880, for an air-cooling and refrigerating apparatus, the refrigerating effect being produced by the compression and expansion of air. The following description of the apparatus is in general the description contained in the specification, but in a much abbreviated form. The refrigerating chamber is between the decks of a vessel and is for the reception of meats. There are two air-compressing cylinders, the piston-rods of which are connected to the pistons of the two expansion cylinders. The compressed air from the compression cylinders passes up through cylindrical vessels or towers, in which it is subjected to the cooling action of sprays of cold water, and there the compressed and cooled air passes to similar cylindrical vessels, where it is deprived of most of its moisture by passing in contact with a series of perforated plates. The partially dried compressed air passes through a pipe to a second drying device, composed of a number of horizontal tubes. The air in its passage through these tubes is deprived of its remaining moisture, and thence passes through a pipe to the expansion cylinder. The
431 expanded air from the exhaust ports of these cylinders enters chambers, so that any moisture which may remain will

be converted into snow and deposited in said chambers. The expanded air then passes into a main pipe and thereafter into pipes which extend up the sides of the chamber and then horizontally along the beams, the air escaping from the open ends of the pipes, which are of different lengths in order to equalize the distribution of the cold dry air throughout the refrigerating chamber.

It will be seen that in the infringing apparatus the air is not chilled by contact with ice, and that it contains no chest or receptacle for ice, in the ordinary meaning of those terms.

The Kelly reissued patent was under careful examination in 1881 by Judge Nixon in the suit of the present plaintiff against Toffey, but as the infringing mechanism in that case contained an ice-chest filled with ice, by contact with which the air was cooled, the important question in this case, and which relates to the construction of the fifth claim, was not considered by the court.

The same facts which are here presented were under discussion before Judge Blatchford in 1881 upon a motion for preliminary injunction in a suit in equity between the present parties. It was held that the defendants infringed the first and second claims of the Kelly reissue. Since that time, in view of the effect of the reiterated decisions of the Supreme Court, which commenced in the year 1882, upon the subject of reissues, it is now conceded
432 that these claims are undue expansions of the original patent, and the contention is narrowed to the claim concerning which testimony was not presented to Judge Blatchford and which he did not therefore pass upon, and it is conceded that the fifth claim is to receive the same construction which it should properly receive if the original patent had never been surrendered.

In examining this claim, by the aid of the specification and the state of the art in 1864, it is apparent that the patentee's invention included the cooling of carcasses in slaughtering establishments, the cooling of halls, holds of vessels and other apartments in which it might be desired to reduce the temperature of the atmosphere by the introduction of cold air, and that this cooling effect was produced by the introduction and distribution of a sufficient quantity of cool or cold air through such a number of perforated tubes that the air then introduced could be properly equalized, or that the temperature of the apartment be made equable; but he desired to cool, not only the holds of vessels, but also halls or other apartments to which external air was admitted by doors and windows. The principal thing which he had in mind was the cooling of recently slaughtered carcasses of animals. He did not, however, confine himself to that single object, but included the cooling of any apartment, and this was to be done by equalizing throughout the place to be cooled the air introduced or distributed through his system of tubes. The only described or suggested manner by which the cooling of the air that was to be introduced into the apartment was effected was
433 by compelling it to pass over and through ice in an ice-chest by the aid of a blower or fanner. He did not, apparently, intend to include and did not suppose his invention was broad enough to include any method of cooling air which existed in the

use of a scientific means operating in a very different manner from the simple mechanical appliances which he had adopted. He therefore did not suggest the possible use of any other means, but asked for and obtained a patent for the combination of the fanners F, the system of tubes T *t t*, and the ice chest or depository in either of the forms he had described. His claim was not so rigid as to prevent ordinary mechanical modifications of the aperture, which might be on one side or the other or on the end of the small tubes, or mechanical modifications of the shape and length of the pipes themselves. His fanner would include mechanical modifications or equivalent devices by which motion is imparted to air. There might be various forms of chest or depository besides the simple one which his ingenuity had suggested, but the language of his specification does not indicate the idea that the invention, as it lay in his mind, was so far-reaching as to include any and all means of cooling air which the scientific mind had then made known.

Although, as a rule, a patent for a combination includes the known equivalent for the respective elements of the combination, yet I cannot conceive that the clause of the original Kelly patent can be properly construed to include as an equivalent or substitute
434 for the described ice-chest any and all methods of accomplishing the result of chilling air which were known at the date of the patent, unless the specification or the claim gave some suggestion of an invention of such general character.

It is not necessary to inquire whether the invention of Kelly could be generalized or was, in fact, broad enough to have justified him in asking for, when he made his original application, in 1864, and in obtaining a patent for any ice depository or its equivalent—meaning by the term "equivalent" any then known method or apparatus for cooling air and removing moisture, which might consist of cylinders for compressing and expanding air and condensing coils and air pumps—and whether, therefore, under the theory of reissues which prevailed until a comparatively recent date, courts were not justified in construing a claim in a reissue for any ice-chest to include such a substitute; but the original patent shows that the application which he did make and which he intended to make was for a patent of a much narrower character. He described the invention and only the invention which is contained in the claim and which, so far as it relates to the ice receptacle, was the ice chest or depository in either of the described forms—meaning a chest for the reception of ice as the cooling agent. His claim aptly describes the same invention which was described in the specification and an invention complete in itself. The omission to make a broader claim not being the result of inadvertence, accident, or mistake as
435 those terms are now defined could not be corrected by a reissue and cannot now be by expanding the original claim so as to include that which makes the new claim of the reissue invalid.

As is declared in Mahn *vs.* Harwood, 112 U. S., 354—

"If a patent for an invention cannot be lawfully reissued for the mere purpose of enlarging the claim, unless there has been a clear mistake inadvertantly committed in the wording of the claim, such

original claim cannot be enlarged by construction so as to include what has intentionally, and not inadvertently and by mistake, been omitted."

It is unnecessary under the construction of the fifth claim, even if an examination of the testimony of Mr. Brevoort and Professor Morton was proper, to examine the question whether if the ice-chest in either of its forms meant any ice-chest that term would include any receptacle or mechanism in and by means of which air was chilled by any mechanical or chemical instrumentality known at the date of the patent in any other than the broad sense that compression and expansion cylinders were known, by means of which and the force-pump connected therewith air was chilled; or other important questions which have received, as they deserve, the earnest attention of the counsel in the case.

The motion is granted and let judgment be entered for the defendant.

436 And thereupon the court directed that judgment be entered in behalf of the defendant herein for the reasons and upon the grounds set forth in its decision, viz: That the fifth claim of the Kelly reissue patent in suit cannot lawfully be so construed as to include the devices used by the defendant for that purpose, even though it might be true that those devices were well known equivalents for the purpose of cooling air at the date of the original patent; and also that, in view of the construction of the fifth claim, the testimony of Henry L. Brevoort and Henry Morton, tending to prove the equivalency of such devices, is irrelevant.

To which decision and rulings counsel for the plaintiff duly excepted and to each of them.

437 And forasmuch as the exceptions, matters, and things aforesaid would not otherwise appear by the record, I have set my hand to this bill of exceptions, which is hereby allowed, and it is ordered that this bill of exceptions be filed as a part of the record herein, with like force and effect as if it had been duly filed at the time of the rendering of the said decision and the direction for the entry of said judgment.

Witness my hand this 7th day of December, 1885, as of June 12th, 1885.

N. SHIPMAN, *Judge.*

438 "EXHIBIT LICENSE A."

Whereas the Bate Refrigerating Company, which is a corporation, party of the first part, organized and doing business under the laws of the State of New York, are the owners of certain letters patent of the United States for improvements in refrigerators, refrigerating rooms, and refrigerating cars, dated and numbered as follows: Letters patent number 146,980, dated February 3, 1874, and reissued June 30, 1874, as number 5942; also letters patent numbers 123,077 and 123,078, granted January 30, 1872; also letters patent number 156,269, granted October 27, 1874;

And whereas Timothy C. Eastman and Wilbur F. Martin, of the

city of New York, parties of the second part, are desirous of procuring a license under said letters patent for the purposes herein particularly described:

Now, therefore, in consideration of the premises and of the faithful performances of each and all of the covenants, agreements, and admissions on the part of the parties of the second part and each of them, the said party of the first part hereby grants to the parties of the second part license to use the improvements described and claimed in said letters patent in the business of shipping meats from the ports of New York and Boston, in the United States, to any and all ports in Great Britain and France during the terms of said letters patent and in no other business or manner whatsoever, and for that purpose only to erect and use suitable refrigerators in
439 vessels for trading between those ports or points, and for the purpose of reception of goods to be so transported, and for such other purposes as they may desire, to erect and use suitable stationary refrigerators at such ports as may be found to be necessary.

And the said parties of the second part, hereby acknowledging and admitting the validity of said letters patent and the novelty of the invention therein described and claimed and covenanting and agreeing not to contest the same or advise or assist others so to do, hereby covenant and agree as follows:

First. That they will pay to the party of the first part or their assigns for each voyage between any port of the United States and a port of Europe two (2) dollars per head for every carcass of beef and a proportionate amount for other meats carried in a chill-room erected, constructed, or used by them or either of them in any vessel containing or embracing any of the improvements described or claimed in any one or more of said letters patent, payments for license to be due at the commencement of each voyage and to be paid within ten days thereafter.

Second. That they will erect chill-rooms and apparatus on at least ten ships within twelve months from the date of this contract and will, from time to time, increase the number sufficiently to supply the demand for meats of the various markets in Great Britain and France, provided that such demand shall not exceed the supply of same in New York and Boston to such an ex-
440 tent as to advance prices so as to destroy all margin for profits in such shipments.

Third. That they will not nor will either of them at any time during the term of said letters patent construct or use any apparatus containing any invention described and claimed in any of said letters patent, except under the written license of the party of the first part.

It is further agreed that this license is the personal privilege of the parties of the second part, and is not to be and cannot be, without the written consent of the party of the first part, assigned, divided, or shared by them with any person not named herein; and that no structure or apparatus erected hereunder is lawfully made except for use under this license by the parties of the second part, and cannot

be transferred to any other person so as to vest in any other the right to use the same, except, however, in case of the death of either of the parties of the second part, it is agreed that their heirs may use the refrigerators erected by them and fulfill the terms of this agreement with the conditions herein stated.

It is further agreed that so long as the parties of the second part shall faithfully perform all the covenants and agreements on their part to be performed, and shall extend the said business to its fullest extent as agreed above, the party of the first part will not grant any other license or privilege to any other party or parties to ship meats from the ports of New York and Boston to the ports of Great Britain and France.

441 It is further agreed that the party of the first part will defend the parties of the second part in the use of the Bate refrigerating patents herein named.

It is further agreed that, in case the said parties of the second part fail to keep any of the covenants and agreements herein contained, the said party of the first part or its assigns, upon proof of the same, may terminate this license by written notice; and that the parties of the second part reserve the right to cease from further shipments if it can be satisfactorily proven at any time that the business herein described can be no longer carried on except at a loss, but the covenants and admissions in favor of the novelty of the invention, the validity of said patents, and the agreement not to infringe the same shall not be abrogated.

In witness whereof we have hereunto set our hands and seals, in the city of New York, this third day of January, one thousand eight hundred and seventy-six.

WM. W. ROSSITER, *President.*
T. C. EASTMAN. [L. S.]
W. F. MARTIN. [L. S.]

Sealed and delivered in the presence of—on the second page, 5th line, "and for such other purposes as they may desire" was interlined betw-; 4th page, 1st line, "parties of" was stricken out before this paper—

GEO. H. VANDERVOORT. [SEAL.]

442 A. D. 1857. No. 2064.

Refrigerating Apparatus.

(This invention received provisional protection, but notice to proceed with the application for letters patent was not given within the time prescribed by the act.)

Provisional specification left by Charles William Siemens, at the office of the Commissioner of Patents, with his petition, on the 29th of July, 1857.

I, Charles William Siemens, of John street, Adelphi, in the county of Middlesex, do hereby declare the nature of the said invention for

"Improvements in refrigerating and producing ice and in apparatus or machinery for that purpose" to be as follows:

The invention relates to freezing and refrigerating by the expansion of air or elastic fluids. The air is first compressed by a cylinder or pump of any suitable construction, by which its temperature is raised, and it is cooled while in the compressed state, and it is then allowed to expand in a cylinder or engine of any suitable construction, by which its temperature is lowered. The air thus cooled is brought in contact with the articles to be cooled or frozen, and is then conducted through an interchanger or apparatus by which it is made to cool the compressed air which enters the inter-
443 changer in the opposite direction. The pump for compressing the air is worked by a steam-engine or other power, and the engine in which the air expands is made to assist in working the pump. I prefer to connect the steam-engine and the air engine and the pump to the same rod or moving part so as to transmit the power directly from one to the other. If the atmosphere be at 70° Fahrenheit and the air be heated 50° by the compression and then be cooled to 70° and allowed to expand its temperature will be lowered to about 20° more or less. This cold air will then enter the interchanger and cool the next portion of compressed air, say to 30°, and will itself be heated, say, to about 110°, and will pass away into the atmosphere. The compressed air at 30°, being allowed to expand, will be cooled to about 20° below zero, and, in passing through the interchanger, will cool the next portion of compressed air, say, to 10° *degrees* below zero. This, on expanding, will be reduced to about 60° below zero, and so on. These temperatures are mentioned not as the absolute temperatures, but to show that the principle of the invention is adapted to produce an accumulated effect or an indefinite reduction of temperature.

I construct machinery or apparatus for carrying out the invention by immersing the engine in brine, or a solution of chloride of calcium, or other suitable fluid which will not congeal at the temperature which it is required to produce. I cause the air, after ex-
panding in the engine, to pass into a series of tubes immersed
444 in the brine or other fluid. These tubes are perforated on their under sides, so that the air passes through the brine in a multitude of streams or bubbles, and thus cools the brine, or the air is admitted into a casing surrounding the brine vessel and allowed to pass through perforations in the sides. The vessel which contains the brine is covered, and the cold air is conveyed from it through the interchanger, which consists of a series of tubes enclosed in a case. The cold air is conveyed through the tubes, while the compressed air passes in the contrary direction through the case, or *vice versa*. The compressed air thus enters warm and passes out cold, while the expanded air enters cold and passes out warm. The water or other liquids or articles to be cooled or frozen are immersed in the aforesaid brine or other fluid. Thus the heat which is continually abstracted from the articles to be cooled or frozen is carried off by the heated air. This current of heated air may be allowed to escape into the atmosphere, or it may be employed for any purpose

for which such a current of heated air may be required. The construction of the interchanger may be varied, or two or more regenerators or respirators filled with wire gauze or metallic plates, or other suitable materials may be employed alternately for the compressed and expanded air. The water or the liquid to be cooled or frozen may also be conducted through tubes in the interchanger or exposed to the contact of the cold air, so as to cool it down before it enters the vessel in which it is to be frozen. When it is required to supply cold air to a cellar or chamber of any sort the cold ex-
445 panded air is conducted into such chamber, and on leaving the chamber it passes through the interchanger, as before.

446 At a stated term of the circuit court of the United States for the third circuit and the district of New Jersey, held, at the rooms thereof, in the city of Trenton, on the 22nd day of January, 1881.

Present: Hon. John T. Nixon, district judge.

THE BATE REFRIGERATING COMPANY, Complainant,
vs.
GEORGE A. TOFFEY, GEORGE C. TOFFEY, DANIEL TOFFEY, JOHN J. TOFFEY, and WILLIAM V. TOFFEY, Defendants. } In Equity.

This cause came on to be heard at the March term, 1879, upon the pleadings and proofs, and was argued by counsel for the respective parties; and now, upon consideration thereof, it is—

Ordered, adjudged, and decreed that the letters patent of the United States numbered reissue 7643, granted on the 24th day of April, 1877, to Moses J. Kelly, for improvements in air cool-
447 ing and distributing apparatus (the same being the letters patent on which the above-entitled suit is brought), are good and valid in law.

That the Bate Refrigerating Company, the complainant herein, is the sole owner of said letters patent and of all rights thereunder.

That the said defendants, George A. Toffey, George C. Toffey, Daniel Toffey, John J. Toffey, and William V. Toffey, have infringed the first, second, third, and fifth claims of said letters patent and upon the exclusive rights of the complainant under the same.

That the complainant recover of the said defendants the gains, profits, and advantages which they or either of them have received or made or which have accrued to them or to either of them from said infringement by the manufacture, use, or sale of the improvements described in and secured by the first, second, third, and fifth claims of said letters patent since the 24th day of April, 1877, and also the damages which the complainant has sustained thereby.

That it be referred to S. Duncan Oliphant, Esquire, a master of this court, to ascertain and take and report to the court an account of the gains, profits, and advantages which have arisen or accrued to the said defendants or to either of them from the manufacture, use, or sale of said improvements, and to ascertain and report the damages which the complainant has sustained thereby.

That the complainant, on such accounting, have the right
448 to cause an examination of the said defendants and each of them, and their servants, *ore tenus* or otherwise, and also the production of the books, vouchers, and documents of said defendants, as said master may appoint.

That a perpetual injunction be issued herein against the said George A. Toffey, George C. Toffey, Daniel Toffey, John J. Toffey, and William V. Toffey, restraining them and their attorneys, agents, servants, and workmen from directly or indirectly making, using, or selling, or in any way counterfeiting or imitating the invention and improvements described in and secured by the first, second, third, and fifth claims of said reissued letters patent granted as aforesaid.

That the complainant do recover of the said defendants its costs and disbursements herein, to be taxed.

JNO. T. NIXON, *J.*

[SEAL.] A true copy.

S. D. OLIPHANT, *Clerk.*

449 At a stated term of the circuit court of the United States for the second circuit and the southern district of New York, held at the city of New York, on the 26th day of July, 1881.

Present: Hon. Samuel Blatchford, circuit judge.

BATE REFRIGERATING COMPANY, Complainant, *vs.* JOSEPH EASTMAN, Defendant.	In Equity. Concerning U. S. Reissued Letters Patent No. 7643.

On reading and filing complainant's notice of motion for a preliminary injunction against the defendant herein and proof of service thereof, together with the affidavits of Paul H. Bate (2), Henry L. Brevoort (2), John J. Bate, William W. Rossiter, Henry Morton (2), and Henry B. Renwick (2); a certified copy of the opinion of his honor Judge Nixon, filed January 19th, 1881, in the suit of the Bate Refrigerating Co. *vs.* George A. Toffey *et als.*, in the U. S. circuit court, district of New Jersey; a certified copy of the interlocutory decree entered in said case; a certified copy of the findings of the court in the suit of Paul H. Bate *vs.* Timothy C. Eastman, in
450 the supreme court, county of Kings, State of New York; certified copies of the decrees entered in the suits of the Bate Refrigerating Co. *vs.* Jacob F. Taylor, in the U. S. circuit court, district of Massachusetts; The Same *vs.* Samuel F. Woodbridge, in the U. S. circuit court, district of Massachusetts; The Same *vs.* Charles Snowden and Patrick McConville, composing the firm of Snowden & McConville, in the U. S. circuit court, southern district of New York; The Same *vs.* Lehman Samuels and Levi Samuels, composing the firm of Lehman Samuels & Brother, in the U. S. circuit court, southern district of New York; a certified copy of reissued letters patent of the United States granted to Moses J. Kelly April 24th, 1877, and numbered 7643, for an "improvement in air cool-

ing and distributing apparatus," and a certified copy of letters patent of the United States granted to J. J. Coleman April 6th, 1880, and numbered 226,281, for "refrigerating apparatus," for the complainant in support of said motion and the affidavits of George A. Banta, Joseph Eastman, Timothy C. Eastman (2), J. Boyd Eliot (2), Frank A. Ferris, Emanuel Frankfeld, A. W. Granville, Wilbur F. Martin, E. S. Renwick, Wm. W. Rossiter, Levi Samuels, Jacob F. Taylor, Samuel F. Woodbridge, James A. Lippincott, John J. Coger, Thaddeus S. Carman, M. H. Maguire, H. H. Hollis, and Walter Lannigan; a book entitled "Refrigerator Patents," and the answer of the defendant herein to the bill of complaint herein for the defendant; and, after hearing counsel for the respective parties, it is now, on motion of Dickerson & Dickerson, Esqs., solicitors for the complainant—

451 Ordered, That a preliminary injunction issue against the defendant, Joseph Eastman, herein, enjoining him, his clerks, attorneys, agents, servants, and workmen, until the further order of this court, from making, using, or selling the invention and improvement described in the reissued letters patent on which this suit is brought, and secured by the first and second claims thereof, which claims are as follows:

1st. "In an air-cooler or apparatus for cooling carcasses, &c., the combination of a fan-blower or its equivalent, an ice-chest or equivalent, and one or more pipes or conduits, which equably distribute the air within the place or apartment to be cooled, substantially as and for the purpose herein set forth."

2nd. "In an air-cooler or apparatus for cooling carcasses, &c., the combination, with the ice-chest, of one or more perforated distributing or equalizing tubes or conduits, substantially as and for the purpose herein set forth."

(Signed) SAM'L BLATCHFORD.

(Endorsed:) U. S. circuit court, so. dist. of N. Y. Bate Refrigerating Company against Joseph Eastman. Injunction order. Dickerson & Dickerson, sol'rs for compl't, Staats Zeitung building, Tryon Row, N. Y. U. S. circuit court. Filed Jul. 29, 1881. Joseph M. Duel, clerk.

452 The President of the United States of America to Joseph Eastman, his clerks, attorneys, agents, servants, and workmen, Greeting:

Whereas it has been represented to us, in our circuit court of the United States for the second circuit and the southern district of New York, that reissued letters patent of the United States were issued, in due form of law, on the 24th day of April, 1877, to Moses J. Kelly, for an "improvement in air cooling and distributing apparatus," and numbered 7643, and that you, the said Joseph Eastman, have infringed the rights secured by the said reissued letters patent by making, using, or selling the invention and improvement described in said reissued letters patent, and secured by the first and second

claims thereof, contrary to the form of the statute in such case made and provided:

Now, therefore, we do strictly command and enjoin you, the said Joseph Eastman, and your clerks, attorneys, agents, servants, and workmen, under the pains and penalties which may fall upon you and each of you in case of disobedience, that you forthwith and until the further order of this court desist from making, using, or selling the invention and improvement described in said reissued letters patent, and secured by the first and second claims thereof, which claims are as follows:

1st. "In an air-cooler or apparatus for cooling carcasses, &c., the combination of a fan-blower or its equivalent, an ice-chest or
453 equivalent, and one or more pipes or conduits, which equably distribute the air within the place or apartment to be cooled, substantially as and for the purpose herein set forth."

2nd. "In an air-cooler or apparatus for cooling carcasses, &c., the combination, with the ice-chest, of one or more perforated distributing or equalizing tubes or conduits, substantially as and for the purpose herein set forth."

Witness the Honorable Morrison R. Waite, Chief Justice of the Supreme Court of the United States, at the city of New York, this 30th day of July, A. D. 1881.

Seal U. S. Circuit Court, S. D. N. Y.

(Signed) JOSEPH M. DUEL, *Clerk.*

DICKERSON & DICKERSON,
Compl't's Sol'rs.

(Endorsed:) U. S. circuit court. Bate Refrigerating Company against Joseph Eastman. Injunction. Dickerson & Beaman, sol'rs for compl't, Staats Zeitung Building, Tryon Row, New York. U. S. circuit court. Filed Sep. 10, 1881. Joseph M. Duel, clerk. I hereby deputize Wm. T. Smith to serve the within writ. July 30th, 1881. (S'g'd) Henry E. Knox, U. S. marshal.

SOUTHERN DIST. OF NEW YORK, *ss:*

Wm. T. Smith, being duly sworn, deposes and says that on
454 the 30th day of July, 1881, at No. 1 East 72d street, in the city of New York, he served on the within-named Joseph Eastman the within injunction by showing him the within original and leaving with him a copy of the same.

(S'g'd) WM. T. SMITH.

Sworn to Aug. 1, 1881.

(S'g'd) JOHN A. SHIELDS,
U. S. Comm'r, S. D. of N. Y.

I certify that the within writ was served, as appears by the affidavit of W. T. Smith, endorsed thereon.

(Signed) HENRY E. KNOX,
U. S. Marshal.

N. Y. Sept. 10, 1881.

455 A. D. 1853. No. 147.

Refrigerating Apparatus.

Letters patent to William Williams, of Eccleshall, in the county of Stafford, engineer, for the invention of "improvements in refrigerating apparatus."

Sealed the 24th of June, 1853, and dated the 20th of January, 1853.

Provisional specification left by the said William Williams, at the office of the Commissioner of Patents, with his petition, on the 20th of January, 1853.

I, William Williams, of Eccleshall, in the county of Stafford, engineer, do hereby declare the nature of the said invention for "improvements in refrigerating apparatus" to be as follows:

The invention relates to arranging apparatus for refrigerating purposes so that air may be compressed, and in that condition pass through a close condensing chamber containing water or other liquid whose temperature is lower than that of the compressed air, by which the heat generated by compression will be in part absorbed and carried off, and then conducting such condensed air so that it may expand in contact with that which has to be cooled, from which matter the air in expansion absorbs heat and produces refrigerating effects.

The mode of proceeding is this:

I compress the air in either one or more cylinders by means of suitable plungers, the cylinder or cylinders having suitable
456 ingress and egress valves & pipes or ways to conduct the compressed air to the lower part of the condensing chamber, in which it is condensed by the constant supply of fresh cold liquid.

To assist in the more perfect condensation of the compressed air as it passes upwards through the liquid I supply therein rotary fans or other suitable agitation by which all is kept in motion and a more perfect admixture ensured, and to aid in keeping the parts cool I immerse them in a tank constantly supplied with cold water. The compressed air, after passing through the condensing chamber above referred to, is conducted through a pipe or pipes to a valve or valves, a reticulate work place at the lower part of the open vessel or vessels containing the liquid or solid matters to be cooled, and in issuing from these valves it expands in immediate contact with the liquid or solid matter to be cooled.

In some cases, as when converting water into ice, I place the vessels containing the water to be frozen in another open vessel supplied with suitable fluid kept cool by the same process, and when congelation commences in the vessel containing the water to be frozen I withdraw the valves from the inner vessel and continue the process through the aid of the mixture in the other vessel containing a fluid only congealable at a much lower temperature. The liquid I prefer to use in the outer vessel is naphtha, spirits of wine, or other liquid congealable only at low temperatures.

Specification in pursuance of the conditions of the letters patent filed by the said William Williams in the Great Seal Patent Office on the 20th July, 1853.

457 To all whom these presents shall come I, William Williams, of Eccleshall, in the county of Stafford, engineer, send greeting:

Whereas Her Most Excellent Majesty Queen Victoria, by her letters patent bearing date the twentieth day of January, in the year of our Lord one thousand eight hundred and fifty-three, in the sixteenth year of her reign, did, for herself, her heirs, and successors, give and grant unto me, the said William Williams, her special license that I, the said William Williams, my executors, administrators, and assigns, or such others as I, the said William Williams, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might take, use, exercise, and vend within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man an invention for "improvements in refrigerating apparatus," upon the condition (amongst others) that I, the said William Williams, by an instrument in writing, under my hand and seal, should particularly describe and ascertain the nature of the said invention and in what manner the same was to be performed and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said letters patent:

Now, know ye that I, the said William Williams, do hereby declare the nature of the said invention and in what manner the same is to be performed to be particularly described and ascertained *and* in and by the following statement thereof (that is to say):

458 The invention relates to means of converting water into ice, but which are also applicable to producing general refrigerating effects by the expansion, in contact with matters to be cooled, of air which has been previously compressed and which, whilst in that compressed condition, has been deprived of the heat generated by compression.

And I would here state that it has long been proposed to produce cooling and refrigerating influence by the absorption of heat consequent upon the expansion of air which has been subject to compression and which has, whilst under compression, been deprived of the heat generated by the compression, and various arrangements of machinery have been proposed for the purpose, but hitherto, to the best of my knowledge, the arrangements of machinery proposed have not been attended with commercial success; and I mention these in order to state that the present invention consists in improved arrangements of parts of machinery for effecting the compression of the air; also to a mode of arranging condensing chambers for effecting the more perfect absorption of heat from such compressed air which has been subjected to compression, and also to arrangements of apparatus for conducting such condensed and cooled air, in order,

by its expanding in immediate contact with the water or other matters to be cooled, to produce the required refrigerating effects.

In order that the means pursued by me may be fully understood, I will proceed to describe the drawings hereunto annexed.

Description of the Drawings.

459 Figure 1 shows a side view: figures 2 and 3, two end views; figure 4, a sectional plan, and figures 5 and 6, other sectional views of parts of apparatus according to my invention for producing the required condensing and cooling influence upon the air to be employed as the refrigerating means. A A A are three compressing cylinders bolted to the valve chamber B, the whole being secured to the bottom of a water tank, C. Each cylinder is furnished with a hollow plunger, E, accurately fitted to the bore of the cylinder, the upper part of each cylinder being provided with a stuffing-box or gland, F. The packing rings G of such glands are made deep to allow of a cup leather being inserted, as in an hydraulic press, to ensure a more perfect gland. The valve chamber B, to which these cylinders are bolted, is divided into two chambers, I and J. I receives a constant supply of fresh atmospheric air from above, through the pipes K K, and the entrance valves L open inwards, one to each cylinder, A, admitting atmospheric air on the ascent of the plunger E. Through the valve M, opening outwards from the cylinder A, the air is forced into the chamber J. From this valve chamber the air is conducted by the syphon pipes N N to the condensing or absorbing chamber O. The chamber O is cylindrical and secured to the tank C, one end passing through the side of the tank to allow the stuffing-box P to be adjusted. Through the chamber O passes the shaft Q, furnished with vanes R, similar to a fan blast; but I prefer that they should be perforated with holes. The chamber O is supplied with water from the tank C by the double-action force-pumps S, through the pipes S, to about the depth shown by the dotted lines, the water being at the same time with-
460 drawn from the chamber O, through the pipes S, by the same pump, S.

The action then of this part of the apparatus is as follows:

Rotary motion is given to the three throw-crank shafts T by a steam-engine or other suitable power acting by a strap or band upon the pulley T, affixed to the shaft T, each crank working, respectively, a plunger, E, which on its ascent causes a supply of atmospheric air to pass into a cylinder, A, through the valves L, from the valve chamber I, which is supplied through the pipes K. Air thus received into the cylinder A in the descent of the plungers is forced through valves M into the chamber J, from whence it passes through the syphon pipes N into the passage M′ formed around the condensing or absorbing chamber O, which it enters at the bottom, and, after mixing with the water, ascends up the pipe V to supply the expanding apparatus hereafter described—and I prefer that the air in passing into the chamber O should pass through a perforated plate, O′—and thence, rising through the water by its less specific

gravity, it is caused intimately to mingle with the particles of water or other cooling fluid used. By the rapid rotation of the perforated vanes R, affixed to shaft Q, motion to which is communicated from the main shaft T by the rigger W and bolt X, the air is caused to be thoroughly mixed up with and be in contact with the water much longer than it otherwise would, which allows more time for the water to absorb the caloric set free by the compression of the atmospheric air in the cylinders A. The cylinders A, valve chambers, and condensing or absorbing chamber are placed in water in the tank C, which is constantly kept supplied from a
461 well or other convenient source.

The air, compressed and cooled as above explained, passes away by the pipe through valve apparatus, which I will now describe and which I call the expanding apparatus by which the air is allowed to expand in immediate contact with articles to be cooled. Two forms of the expanding-valve apparatus are shown at figures 7 and 8. Each consists of self-acting ball or other suitable valves *a a*, enclosed in small chambers *b b*, the top plates of these chambers being perforated with a number of small holes for the passage and distribution of the atmospheric air on its passage upwards. These balls *a a* are proportioned in size and weight to the area of the orifice of air-pipe *d* and the amount of compression previously determined upon. For a pressure of about eight atmospheres and an opening of half an inch diameter to the mouth-piece I employ a ball of six inches diameter or of about sixty pounds weight. Figs. 9, 10, 11, 12, and 13 show the application of these valves for the conversion of water into ice. V is a continuation of the pipe, charged with compressed and cooled atmospheric air, from that part of the apparatus already described. *f f f* are stop-cocks to regulate or shut off altogether the supply of air from the main pipe V to the expansion valves *a*. *g* is a shallow tank, to the bottom plate, *h*, of which are riveted a number of cylindrical vessels, *i*; at the bottom of each vessel *i* one of the expansion valves *a*, figure 7, is placed, connected to the main pipe V by a branch pipe, *d*, and regulated or shut off by the cock *f*. Into each vessel *i* an inner conical vessel, *k*, is inserted, and attached to the top plate *l* of the tank by a flange joint,
462 *m*, and in each of these vessels is lowered one of the expansion valves *a*, figure 8, also communicating with the main pipe V by a tube, *d* (which in this case is made flexible), and regulated by stop-cocks *f*. Into these conical vessels the water to be frozen is placed, as shown by the dotted blue lines. The interstices between the vessels *k* and the vessels *i* are filled with any liquid (congealable only at much lower temperature than water) to about the height in the tank *g* shown by the dotted blue lines.

The action of this part of the apparatus is as follows:

The conical vessels *k*, being charged with water to be frozen, the expansion valves, figure 8, are lowered by their flexible tubes to the bottom of each vessel. The tank *g* and vessel *i* having been previously filled to the proper height, the stop-cocks *f* are opened and the condensed air from the main pipe V is allowed to pass through each expansive valve. The compressed air, entering the

chambers *b b* of the respective valves, expands and is distributed equally through the liquids in a series of globules, expanding and absorbing heat from the liquid in its passage upwards to the top. The expanded air in the tank, as also in the conical vessels, is allowed to pass off after having performed its duty in absorption. The object in having two separate chambers for expansion and absorption is this: if only one is used, *videlicet*, the one containing the liquid only congealable at low temperatures, congelation of the water in the conical vessels will only take place by conduction.

463 Water, being a slow conductor of heat, quickly becomes frozen and, adhering to the sides of the vessels, forms a coating thereto, leaving the interior in a liquid state, which will take a very long time to solidify. The employment, therefore, of the second expansion valve (Figure 8) in the interior of the liquid to be frozen materially assists in the operation, as the whole body of water is operated upon at the same time. When, however, congelation has to some extent taken place, it will be necessary to shut off the supply of atmospheric air to the valves (Figure 9), which are then withdrawn, and the process is continued by conduction through the aid of the liquid in the vessel *i* and tank *g* until the whole is solidified; the charges are then withdrawn and a fresh charge made, and the operation repeated.

For the cooling of worts and general refrigerating purposes a less complicated apparatus may be used. For the cooling of worts a simple tank, about six feet deep, and of sufficient capacity to contain the quantity of wort to be cooled, and fitted with a number of expansion valves, will be sufficient, as the passage of the atmospheric air upwards will cause a sufficient current to keep the whole quantity of liquid in motion, so that the whole will be of one temperature.

For general refrigerating purposes, such as required by sugar-houses, &c., the vessels containing the saccharine matter may be merely plunged in tanks operated on as in worts.

Having thus described the nature of my said invention I would have it understood that I do not confine myself to the precise details herein shown and described, so long as the peculiar

464 character of any part thereof be retained; but what I do claim is—

First. The employment of cylinders fitted with plungers, as explained, in place of pistons in apparatus used for the compression of air for refrigerating purposes.

Secondly. The construction and arrangement of a separate condensing or absorbing chamber in which the compressed air has its heat (generated by compression) absorbed by being caused intimately to mingle with water or other fluid of a temperature below that of the air forced therein, as above explained.

Thirdly. I claim the placing of the compressing cylinders and the condensing or absorbing chamber and parts connected therewith in a tank of cold water constantly supplied with fresh water for the purpose of aiding to keep the same cool.

Fourthly. I claim the arranging and combining valves in con-

nection with the refrigerating apparatus, as above explained, whereby air compressed and cooled may be caused to expand in immediate contact with the water or other matters to be cooled.

In witness whereof I, the said William Williams, have hereunto set my hand and seal this twentieth day of July, in the year of our Lord one thousand eight hundred and fifty-three.

WM. WILLIAMS.

Witness:

WILLIAM BROOKES, 73 *Chancery Lane.*

465 United States Circuit Court, Southern District of New York.
At Law.

BATE REFRIGERATING COMPANY, Plaintiff,
against
JOSEPH EASTMAN, Defendant.

It is hereby stipulated by and between the attorneys of record for the respective parties hereto that the above-entitled cause be tried before his honor Judge Nathaniel Shipman without a jury.

New York, May 1st, 1885.

DICKERSON & DICKERSON,
Attorneys for Plaintiff.
JOHN R. BENNETT,
Attorney for Defendant.

466 UNITED STATES PATENT OFFICE.

JOHN GORRIE, of New Orleans, Louisiana.

Improved Process for the Artificial Production of Ice.

Specification forming part of Letters Patent No. 8080, dated May 6, 1851.

To all whom it may concern:

Be it known that I, John Gorrie, of the city of New Orleans, in the parish of Orleans and State of Louisiana, have invented a new and useful machine for the artificial production of ice and for general refrigeratory purposes, of which the following is a full, clear, and exact description, reference being had to the annexed drawings of the same, making part of this specification, in which—

Figure 1 is a perspective view of the machine. Fig. 2 is a vertical longitudinal section, taken through the condensing-pump and expanding-engine, for the purpose of showing more clearly their internal structure and arrangements. Fig. 3 is a vertical transverse section through the expanding-engine and its appendages, showing, also, the section of the reservoir. Fig. 4 is a similar section, taken through the condensing-pump. Fig. 4½ is a perspective view of the vessel in which the ice is formed, removed from the refrigerating-chamber. Fig. 5 is a top view of the apparatus. Fig. 6 is a vertical longitudinal section of the machine modified in the structure and

arrangement of some of its parts; and Figs. 7 and 8 are, respectively, vertical transverse sections of the same through the expanding-engine and condensing-pump.

The same letters indicate the same parts in all the figures.

It is a well-known law of nature that the condensation of air by compression is accompanied by the development of heat, while the absorption of heat from surrounding bodies, or the manifestation of the sensible effect, commonly called "cold," uniformly attends the expansion of air, and this is particularly marked when it is liberated from compression.

The nature of my invention consists in taking advantage of this law to convert water into ice artificially by absorbing its heat of liquefaction with expanding air. To obtain this effect in the most advantageous manner it is necessary to compress atmospheric air into a reservoir by means of a force-pump to one-eighth, one-tenth, or other convenient and suitable proportion of its ordinary volume. The power thus consumed in condensing the air is, to a considerable extent, recovered at the same time that the desired frigorific effect is produced by allowing the air to act with its expansive force upon the piston of an engine, which, by a connection with a beam or other contrivance common to both, helps to work the condensing-pump. This engine is constructed and arranged in the manner of a high-pressure steam-engine having cut-offs and working the steam expansively. When the air, cooled by its expansion, escapes from the engine, it is made to pass round a vessel containing the water to be converted into ice, or through a pipe for effecting refrigeration otherwise, the air while expanding in the engine being supplied with an uncongealable liquid whose heat it will absorb, and which can in turn be used to absorb heat from water to be congealed. By this arrangement I accomplish my object with the least possible expenditure of mechanical force, and produce artificial refrigeration in greater quantity from atmospheric air than can be done by any known means.

The apparatus for producing the refrigeratory effects before stated consists, essentially, of a large double-acting force-pump, A, with its jet-pump D, Figs. 1 and 4, condensing-tub R, and worm P, as represented in the drawing No. 4, a reservoir, B, made of such metal in the manner of a steam-boiler, a double-acting expanding-engine, C, provided with cut-offs, a jet-pump, E, a tub, I, and worm H, for cooling water, the engine C and the chamber G above it being inclosed in an insulating-box, F, which box, together with the worm and tub H, are inclosed in a second insulating room or chamber K. The pumps, engine, and other moving parts are provided with the necessary mechanical appliances for putting and keeping them in motion and connecting them with the prime mover, which may be either a steam-engine or other available power.

It is believed that the precise nature of my invention and discovery, and the manner in which the refrigerating effects are produced, can be more clearly and fully set forth by describing the construction and operation of the apparatus in connection. I shall therefore adopt that plan in the remainder of the specification.

In the apparatus represented in Figs. 1, 2, 3, 4, and 5 the piston-rods of the pump A and engine C are attached to cross-heads
467 *d d*, which are connected by rods *c c c c* with the cranks *f' f'* of a revolving shaft, *b*. This main shaft *b* is divided into two parts, which are connected by the flanges *e*, secured to their adjacent ends and bolted together in such a manner that the cranks on that section of the shaft which drives the pump may be placed at any angle of inclination to those which are attached to the opposite section of the shaft and worked by the engine. This angle of inclination should be such that the maximum force of the engine C may be exerted about the same time that the maximum resistance is offered by the pump A—or, in other words, that the engine, supposing that it works under a tension of eight atmospheres, may commence its stroke about the same time that the pump has completed six-sevenths of its stroke. The power of the prime mover is applied to the crank *f* by a connecting-rod, *m*, Fig. 1, and the motion is regulated by fly-wheels *r r*.

The pump A is constructed like the ordinary double-acting force-pump for air or water. It receives atmospheric air through valves N N, placed in its opposite ends, which open inward, and after compressing it to the degree required forces it through the eduction-valves *o o*, which open outward into a pipe, P, through which it passes into the reservoir B. A part of the pipe P is bent into a worm, which is immersed in a tub of cold water, R, to cool the air as it passes through the same.

Air, while being compressed, evolves sensible heat, which, if not absorbed or extinguished as fast as given out, will increase its elastic force greatly beyond what is due to the degree of its compression, thus requiring a greater degree of mechanical power than is absolutely necessary to compress it in the reservoir. To obviate this difficulty as far as practicable, I immerse the pump in a cistern of cold water and inject into its interior a jet of water, also cold, and in a finely-divided or other state, by means of a small pump, D, which bears a suitable relation in its size to the pump A, being in the machine I have built in the proportion I have represented in the drawings, and capable of discharging twenty-eight cubic inches of water for every foot of air compressed by the latter. The pump D is double-acting, receives its motion from the eccentric *h* on the shaft *b*, and forces the water through tubes and perforated plates inserted in the lids of the pump A, into the body of air in the cylinder A. This pump D is so constructed and arranged as to force the jet into the pump A at the beginning, and continue it to the end of the stroke of its piston, so as to meet and absorb the heat as fast as evolved.

It is contemplated, particularly when the apparatus is made upon a large scale, to return the water of injection through the pump D under the pressure of the air in the reservoir, so as to recover some of the power consumed in making the injection, and also to supersede the necessity of employing a greater quantity of water than is required to insure a proper temperature. In this use of the injection-water it is obvious that the valves of the pump D cannot be self-acting, but must be operated mechanically. Air, being a bad

conductor of heat, cools very slowly when in large masses, and as it is essential to the success of this process that most of the heat set free from the air by compression should be absorbed as soon as possible after it is given out, and as the immersion of the cylinder and the injection of the jet of cold water have proved inadequate to effect this result, I have superadded a worm, P, immersed in a tub of water, R, through which the air in its transit from the pump A to the reservoir B must pass, and this effectually absorbs the remainder of the heat.

Instead of the worm, some other form of refrigerating apparatus may be used.

The reservoir B is made of twenty or thirty times the capacity of the condensing pump A, and is provided with a stop-cock, S, inserted into its under side, through which the water of the injection, precipitated from the air, may be discharged. It is also furnished with a gage for measuring with precision the pressure of the air within it. This consists of a glass tube, closed at the upper end, filled with dry atmospheric air, inserted into and in communication with the air in the reservoir through the intervention of a cup of mercury.

The engine C is supplied with the condensed air, which works it from the reservoir B through the pipe T. Its valves V are so arranged as to cut off the supply of dense air from the reservoir when the cylinder has received a quantity which is equal to the quantity condensed by one stroke of the pump A. This air received into the engine tends to dilate with a force corresponding to the degree of its compression, which force acts alternately upon the opposite sides of the piston, communicating to it a reciprocating motion which aids in working the condensing-pump, and thus a part of the force expended in condensing the air is here reclaimed.

The refrigeratory effects of air dilating from the removal of pressure can be rendered available to the fullest extent only when the expansion is gradual, because time is required to enable it to absorb heat, and therefore the employment of the compressed air as a mechanic agent retards its expansion sufficiently to allow it to absorb the greatest amount of heat from the liquid of the jet and the walls of the cylinder, thus being an advantage to the freezing process.

The jet for the engine C is furnished by the pump E. The capacity of this pump bears the same relation to that of the engine that the pump D does to the pump A. It is arranged and operated in precisely the same manner as the pump D, except that its supply of liquid is obtained through the pipes X from the cistern W, into
which, after it has performed the office of intermixture with
468 the expanding air in the cylinder, it is returned through the
eduction-valve Z. As the temperature of the engine C, the cistern which surrounds it, and the expanding air must be kept considerably below the freezing-point of water to make ice advantageously, it follows that the liquid which fills the cistern W must be uncongealable at the low temperature at which this portion of the apparatus is required to be kept. As the waste of this liquid in a properly-constructed machine is only that which arises

from evaporation, and as this latter is small at the low temperature maintained, its first cost is not a consideration of much importance, so that any liquid uncongealable at the low temperature required may be employed—as proof-spirit a solution of common salt, or of the nitrate or carbonate of potash, &c. As the air when expanded in the engine C is at a much lower temperature than that at which it is received into the pump A, and as its volume is directly as its temperature, it follows that the capacity of the engine C must be less than that of the pump A, in order that the engine may be filled with air fully expanded at a tension not less than the atmospheric, or that it may not be consumed faster than it is compressed into the reservoir. The difference between the capacity of the pump A and the engine C should be directly proportioned to the intensity of cold required to be produced, and hence the mechanical force applied by the engine will in all cases be less than that consumed by the pump, in the proportion that the heat of the air escaping from the engine is less than that entering the pump. This excess in the consumption of force by the pump over its production by the engine, together with the amount of force necessary to keep the other parts of the apparatus in motion, must be supplied, as already mentioned, from some extraneous source. The air, after its expansion in the cylinder C, passes out intimately mixed with the liquid of injection at the eduction-valve Z, and through tubes connected therewith into the cistern W, which is filled with fluid nearly to the top of the vessels J, containing the water to be converted into ice. In this way the mass of fluid in the cistern is constantly having its heat absorbed by the expanding air and cooled fluid of the jet, while at the same time it is constantly absorbing the heat of liquefaction from the water in the vessels J, which is thereby congealed. It will thus be seen that the uncongealable liquid of the cistern W merely acts as a medium to transmit the heat of the water to be congealed to the expanding air in the engine.

Experience has shown that if the vessels J be filled with water previous to the commencement of the process of refrigeration, the operation will be greatly retarded by the formation of an insulating coating of ice on its surface and on the interior of the sides and bottom of the vessels. The difficulty has, however, been obviated by furnishing the water in a small stream, and only as fast as it is frozen, by means of a flexible tube, *t*, from the cistern I. The congelation is further hastened by rocking or jarring the vessels slightly by connecting them with some of the moving parts of the machinery. Ice is specifically lighter than water, and will therefore float on it; hence it follows that if water be admitted into the vessels J so gradually as to be frozen in films, as every film is formed it must be displaced by a film of water, which, in virtue of its superior gravity, passes under it, to be in like manner frozen to the under side of the first film of ice, and thus by successive increments of ice formed in this manner a solid block filling the vessel J may be produced. By widening the vessel J from the bottom upward the removal of the block of ice is not only rendered more easy, but the formation of it is assisted. The smaller part of the block, by grad-

ually ascending into the larger part of the vessel, keeps a passage open around it, through which the water to be frozen runs down to the bottom. In this manner the important advantage is gained of freezing water from its under surface instead of its upper, thereby exposing every particle of it to the frigorific action of the cistern-liquid without subjecting it to the intervention of an insulating coating of ice.

To further facilitate the removal of the ice from the vessels J, they are not only made a little smaller at the bottom than at the top, but are lubricated with a thin coating of oil or grease by means of a sponge.

The cover of the refrigerating-chamber G is removable for the purpose of introducing and withdrawing the freezing-vessels J, which are suffered to remain in it such length of time as experience may determine is most advantageous. These vessels should be made of good conductors of heat, and may be of any suitable and convenient size.

In order that the capacity of the expanded air for the absorption of heat may be rendered more fully available, and also for the purpose of more effectually separating from it the liquid of the jet, it is conducted from the chamber G through the pipe H, which is bent into the form of a worm and surrounded by water in the tub I. The air in its passage through this pipe deprives the water in the tub of a portion of its heat, and as this cistern-water is the source of supply for the freezing-vessels J, its incidental refrigeration by the escaping air is so much gain to the process.

In the modified form of the apparatus (represented in Figs. 6, 7, and 8) the force-pump A and expanding-engine C are connected with the opposite ends of a lever-beam, M, by means of links, jointed to their respective piston-rods L and U. This connection insures uniformity of action between the pump and engine, and enables the latter to act directly upon the pump, to aid in working it. As an inspection of the drawing of this modified arrangement will render it fully understood, if made in connection with the descrip-
469 tion of the process as performed by the machine (represented in Figs. 1, 2, 3, 4, and 5), I have deemed an explanation of the same in detail to be unnecessary.

The several parts of the foregoing apparatus may be made of such materials as it may be deemed advisable by the constructor to employ in reference to the efficiency of the machine, economy in its cost, or other considerations that may influence him, and the form and arrangement of the several parts may be varied indefinitely without essentially changing the character of the invention.

It will have been seen that a great object aimed at in the construction of the machine is as perfect a system of compensations (chemical and mechanical) as possible. Thus the heat evolved and carried off in the condensation of air is replaced in the expanding-engine by an abstraction of heat from the water to be frozen through the intervention of the liquid in the cistern. In the consumption and production of mechanical force these compensating equivalents are more general and more marked. It has already been intimated

that the power consumed in compressing air is nearly all recovered in the force exerted by its subsequent dilatation, and it has been shown in what way the force required to inject the water for receiving the heat of the condensed air may be, in a great measure, derived from the pressure of the air in the reservoir. It is evident that a mechanical apparatus admitting of such a system of compensations must operate, in theory at least, without the consumption of any power other than that required to overcome its friction, and to supply the loss arising from the difference of temperature, and consequently of bulk, between the air as it exists before condensation and after expansion; and, practically, the working of the machine is found not to differ materially from this result, and thus it presents by far the most comprehensive application of natural laws to the economical production of cold that is believed has ever been devised.

Having thus fully made known my improved process of manufacturing ice and explained and exemplified suitable machinery for carrying the same practically into operation, I wish it to be understood that I do not claim as my invention any of the several parts of the apparatus in themselves; but

What I do claim as my invention, and desire to secure by letters patent, is—

1. The employment of a liquid uncongealable at the low temperature at which it is required to keep the engine, to receive the heat of the water to be congealed and give it out to the expanding air.

2. The employment of an engine for the purpose of rendering the expansion of the condensed air gradual, in order to obtain its full refrigeratory effects, and at the same time render available the mechanical force with which it tends to dilate, to aid in working the condensing-pump irrespective of the manner in which the several parts are made, arranged, and operated.

3. Supplying the water gradually and slowly to the freezing-vessels and congealing it by abstracting the heat from its under surface, substantially as herein set forth.

4. The process of cooling or freezing liquids by compressing air into a reservoir, abstracting the heat evolved in the compression by means of a jet of water, allowing the compressed air to expand in an engine surrounded by a cistern of an unfreezable liquid, which is continually injected into the engine and returned to the cistern, and which serves as a medium to absorb the heat from the liquid to be cooled or frozen and give it out to the expanding air.

JOHN GORRIE.

Witnesses:

JOHN G. RUAN.
J. R. POTTS.

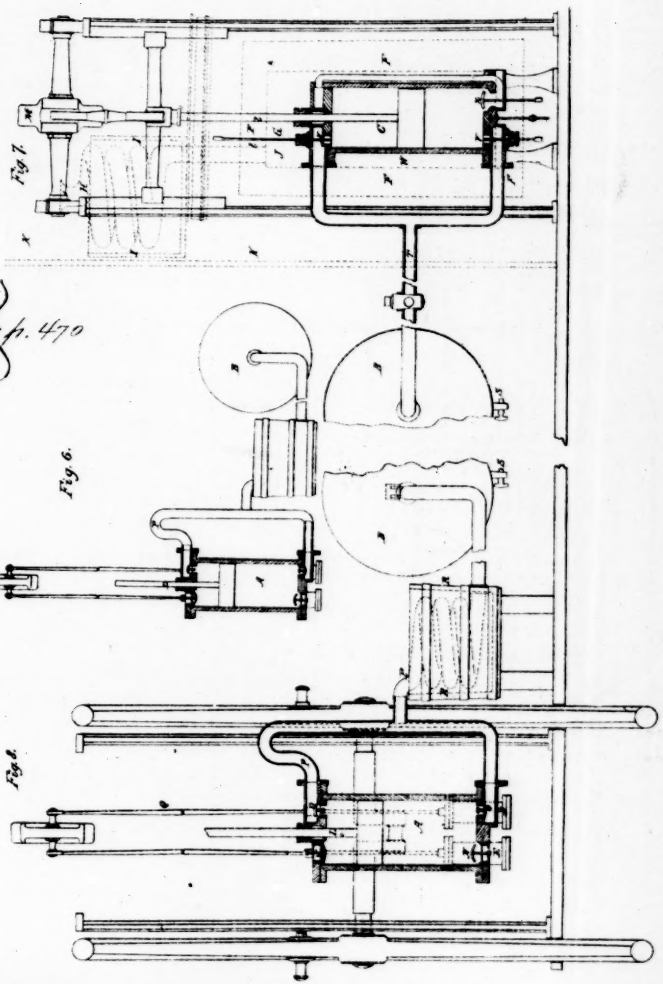
(Here follow diagrams marked pp. 470 to 477, inclusive.)

Sheets, 6 Sheet 1

J. Gorrie

Ice Mach

No 8,080. Patented May 6, 1851



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B.R. Co.
Eastman
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No. 347.
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Eastman
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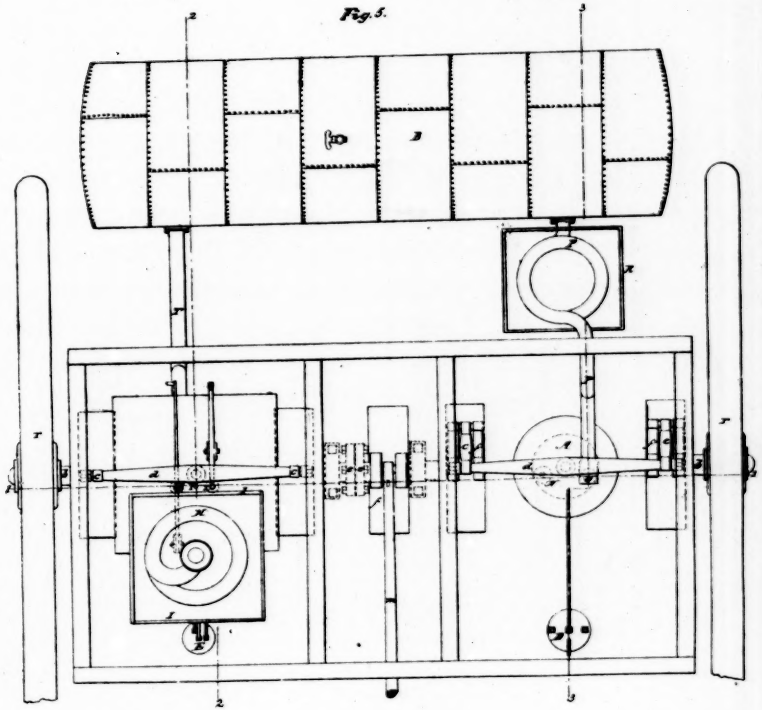
Sheet 2 & 3 Sheets.

J. Garrie.

Ice Mach.

No. 9,080. Patented May 6, 1851.

Fig. 5.



Sheet 1. 1 Sheet

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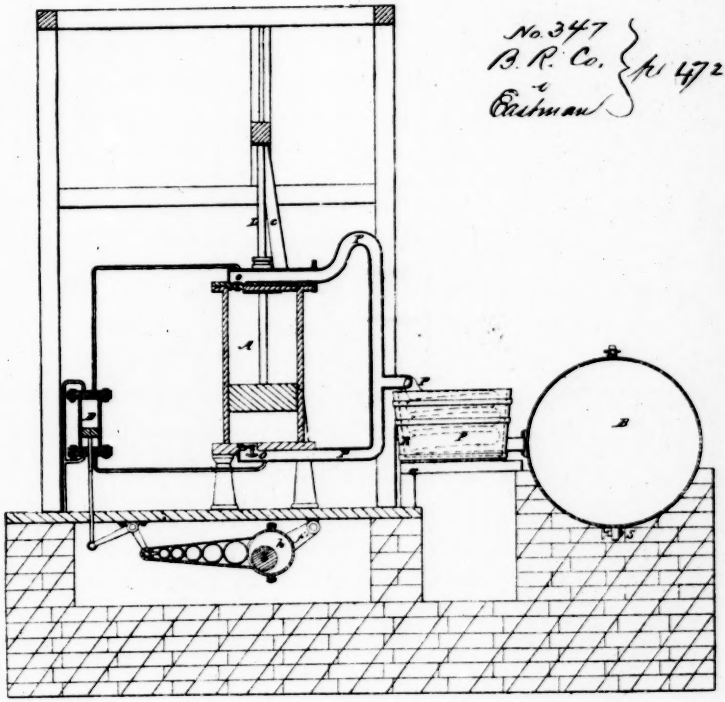
Ice Mach.

No 8,080 Patented May 6, 1851

Fig. 4.



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J. Gorrie

Ice Mach.

No. 8,080 Patented May 6, 1851

Fig. 3.

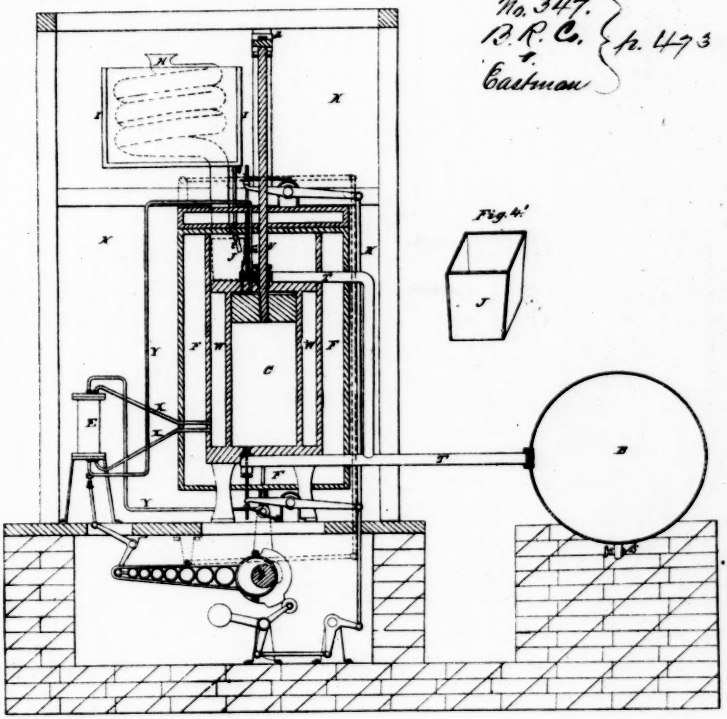

Fig. 4.

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474.

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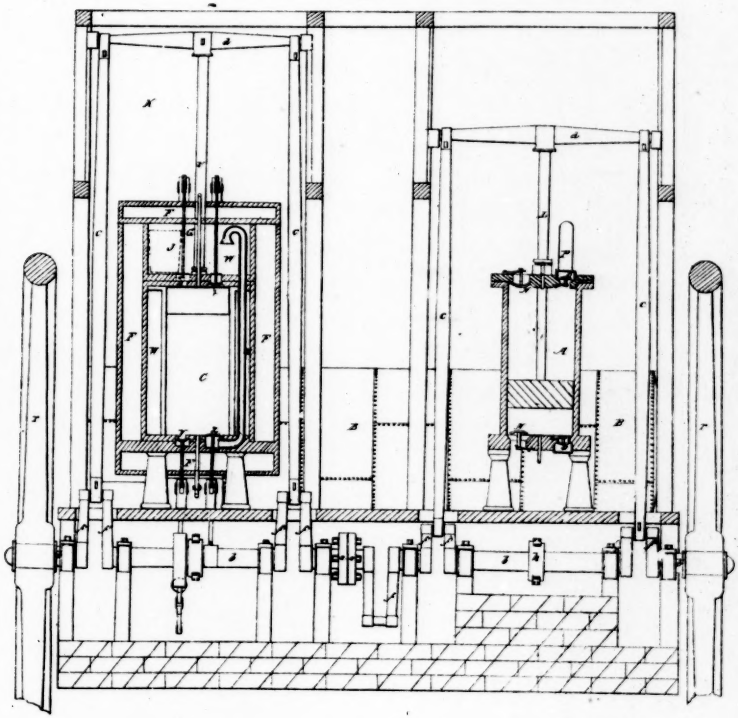
J. Gorrie

Ice Mach.

No 8,080 Patented May 6, 1851

Fig. 2.



475.

Sheet 1, 0 Sheets.

J. Gorrie

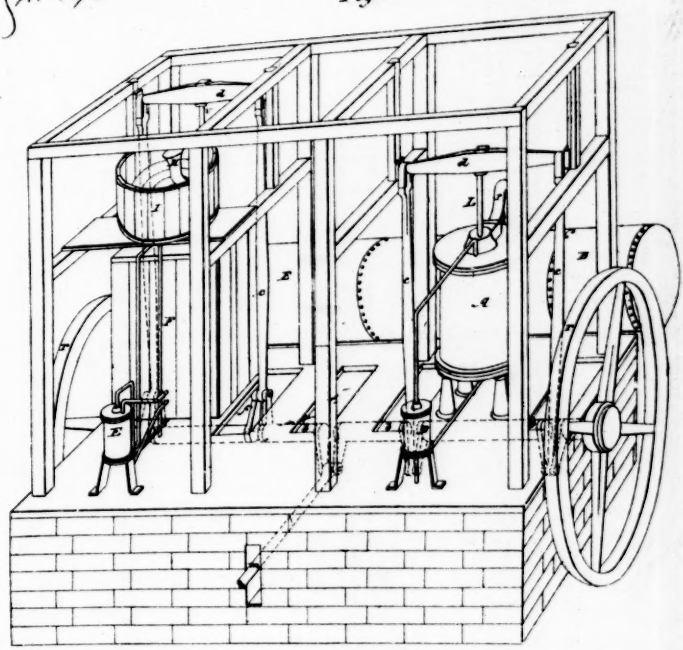
Ice Mach.

No. 347
B. R. Co.
v.
Eastman

No 8,080

Patented May 6, 1851.

Fig. 1.



476.

J. J. COLEMAN. 2 Sheets—Sheet 1.

Refrigerating Apparatus.

No. 226,281. Patented April 6, 1880.

No. 347
B. R. Co.
v.
Eastman
} p. 476

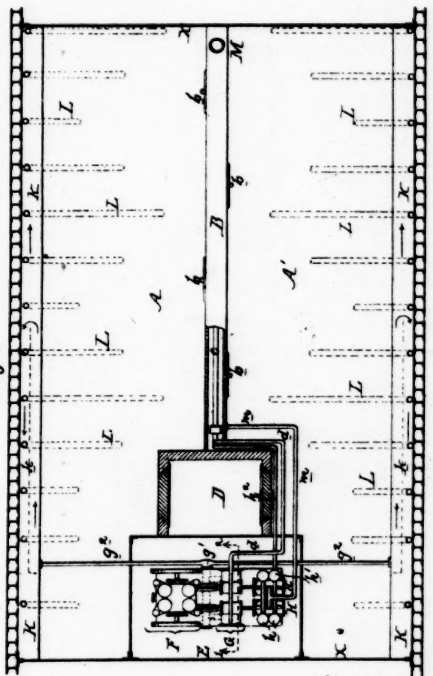


Fig. 1.

Witnesses
Henry Howson Jr
Harry Smith

Inventor
Joseph James Coleman
by his Attorneys
Howson and Son

477

2 Sheets—Sheet 2

J. J. COLEMAN.

Refrigerating Apparatus.

No. 226,281. Patented April 6, 1880.

No. 247.
B. R. Co.
v.
Eastman
} 4. 477

Fig. 3

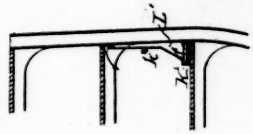


Fig. 2.

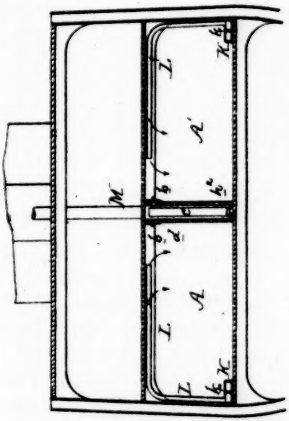
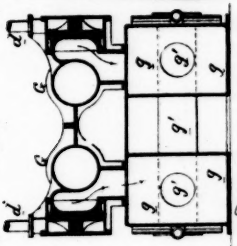


Fig. 4



Witnesses
Henry Howson Jr
Harry Smith

Inventor
Joseph James Coleman
by his Attorneys
Howson and Co

478 UNITED STATES PATENT OFFICE.

JOSEPH J. COLEMAN, of Glasgow, Scotland.

Refrigerating Apparatus.

Specification forming part of Letters Patent No. 226,281, dated April 6, 1880; application filed May 19, 1879.

To all whom it may concern:

Be it known that I, Joseph J. Coleman, of Glasgow, Scotland, have invented new and useful improvements in air-cooling and refrigerating apparatus, of which the following is a specification.

My invention relates more particularly to that class of refrigerating apparatus in which the refrigerating effect is produced by the compression and expansion of air, such, for instance, as the apparatus described in the United States Patent No. 202,509, granted to H. and J. Bell and myself April 16, 1878.

The object of my invention is to so construct an apparatus of this character that the air injected into the refrigerating-chamber shall be thoroughly cooled and dried and evenly distributed throughout the chamber, and that the distributing-pipes shall not be choked up by snow formed by the freezing of the moisture in the air.

In the accompanying drawings, figure 1, sheet 1, is a sectional plan of a portion of a vessel with my improvements; Fig. 2, sheet 2, a vertical transverse section of the same; Fig. 3, a sectional view of a modified form of air-distributing conduits; Fig. 4, an enlarged sectional view on the line 1 2, Fig. 1.

The refrigerating-chamber is in the present instance arranged between the decks of the vessel for the reception of the meat or other provisions to be preserved, and extends from one side of the vessel to the other, being closed at the ends by transverse bulk-heads X X. The chamber is divided into two compartments by a longitudinal double partition or casing, B, and by the hatchway D and the walls of the engine-room E.

H H represents two horizontal double-acting air-compressing cylinders, the piston-rods of which are connected to the pistons of the horizontal expansion-cylinders G G, driven by a steam-engine, F, of any suitable construction, the latter, together with the compression and expansion cylinders, being preferably mounted on one bed-plate.

When the apparatus is in operation the compressed air from the cylinders H passes up through vertical cylindrical vessels *h*, Fig. 1, in which it is subjected to the cooling action of sprays of cold water, and thence the compressed and cooled air passes to similar vertical cylindrical vessels *h'*, where it is deprived of most of its moisture by passing in contact with a series of perforated plates, as described in the above-mentioned patent. The cooled and partially-dried compressed air then passes through a pipe, h^2, to a second drying device, C, arranged in the casing B, and composed preferably of a number

of horizontal or inclined tubes connected at opposite ends by vertical casings. The air in its passage through these tubes is deprived of its remaining moisture and passes through the pipe *d* to the expansion-cylinders G in a thoroughly-dried condition.

The expanded air from the exhaust-ports of the cylinders G enters chambers *g*, arranged immediately below said cylinders, as shown in Fig. 4, so that any moisture which may remain in the air will, on the expansion of the latter, be converted into snow and deposited in said chambers *g*. The expanded air thence passes into the main pipe *g'*, which is of such a size that any snow deposited therein will not be sufficient to obstruct the passage of the air. This main pipe communicates, through branch pipes g^2 g^2, with casings or ducts K, which may be arranged along each side of the refrigerating-chamber, Fig. 2.

From the point where the pipes g^2 communicate with the casings vertical partitions *k* are arranged in these casings and extend nearly to the middle of the chamber, as shown by dotted lines in Fig. 1, so that the air on entering is compelled to pass to the centers of the casings and thence spread in opposite directions, as indicated by the arrows, before it can pass up through the series of vertical pipes L, the object of this being to obtain an equal distribution of the air. The pipes L extend up the sides of the chamber, and thence horizontally along the beams, as shown in Fig. 2, the air escaping from the open ends of the pipes, which are of different lengths in order to equalize the distribution of the cold dry air throughout the refrigerating-chamber.

The opposite sides of the casings B are provided with a number of valved openings, *b b*, through which the air from the refrigerating-chamber may enter the casing and come into contact with the air-drying pipes C, so that the compressed air in passing through these pipes may be further cooled by the cold air of the
479 refrigerating-chamber before the said compressed air passes into the expansion-cylinders, where its rarefaction produces the required degree of cold, as described in the above-mentioned patent granted to H. and J. Bell and myself.

The air from the refrigerating-chamber passes from the interior of the casing B, through the pipe *m*, back to the compressing cylinders H H, so that the same air may be used over and over again; but in almost all cases it is necessary to admit more or less fresh air, and this may be done, in the present instance, through the medium of a pipe, M, in communication with the atmosphere and with the interior of the casing B, as shown in Figs. 1 and 2, the proportion of fresh air admitted being regulated by means of a suitable valve.

Instead of having a series of pipes, L, to distribute the air into the refrigerating-chamber, each casing K may be provided with a horizontal partition, *k'*, Fig. 3, corresponding with the partition *k*, arranged to communicate through a series of openings with an open space, L', formed by a longitudinal inclined partition, k^2, over the top of which the air flows into the compartment.

Although I have shown my improvements as applied to a vessel,

M. J. KELLY.

Air Cooler and Distributer.

No. 7,643. Reissued April 24, 1877.

Fig. 1.

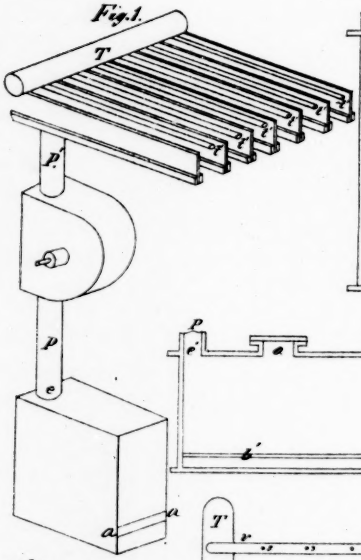


Fig. 2.

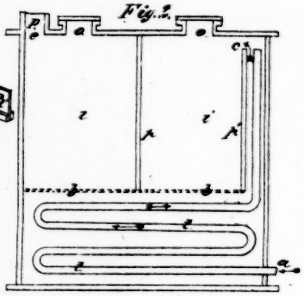
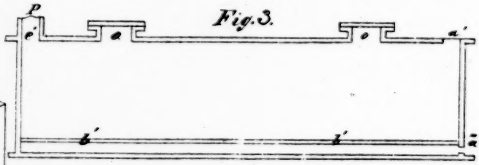


Fig. 3.



No. 347 B.R. Co. } h. 480
v. Eastman

Fig. 4.

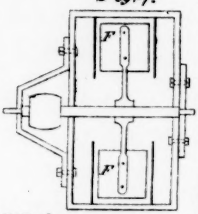
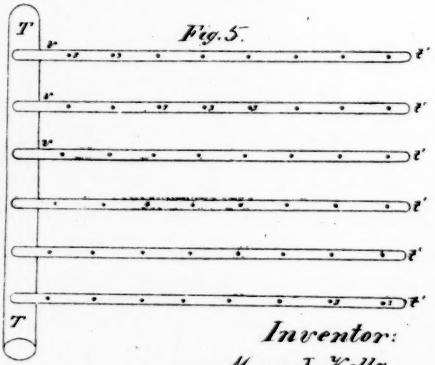


Fig. 5.



Witnesses:
Henry Essling
H. Wells Jr.

Inventor:
Moses J. Kelly
per James A. Whitney
Atty

it will be understood that they can readily be applied to structures of different kinds without departing from my invention.

I claim as my invention—

1. The combination of a refrigerating-chamber with air-pipes g^2, a casing, K, in said chamber provided with a partition, *k*, and pipes or conduits leading from said casing and having their outlets near the roof, substantially as described.

2. The combination of a refrigerating-chamber with air-pipes g^2, a casing, K, in said chamber provided with a partition, *k*, and open-ended pipes L, of different lengths, along the roof, all substantially as set forth.

3. The combination of the exhaust-port of an air-expansion cylinder with snow-chambers *g*, immediately below said port, substantially as specified.

4. The combination of air-expansion cylinders G with snow-chambers *g* and pipe *g'*, as and for the purpose set forth.

5. The combination of a refrigerating-chamber and a casing, B, forming a partition between the two parts thereof and having openings into said chambers, with a pipe, *m*, compression and expansion cylinders, and drying-pipes C within said casing, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH JAMES COLEMAN.

Witnesses:

WILLIAM J. COOPER.

HARRY SMITH.

(Here follows diagram marked p. 480.)

481 UNITED STATES PATENT OFFICE.

MOSES J. KELLY, of Chicago, Illinois.

Improvement in Air Cooling and Distributing Apparatus.

Specification forming part of Letters Patent No. 44731, dated October 18, 1864; antedated October 6, 1864; reissue No. 7643, dated April 24, 1877; application filed January 4, 1877.

To all whom it may concern:

Be it known that I, Moses J. Kelly, of Chicago, in the county of Cook and State of Illinois, have invented a new and useful improvement in air cooling and distributing apparatus, for cooling carcasses where hung to cool in slaughtering-establishments, cooling halls, railroad-cars, grain-bins, the holds of vessels, and other places and apartments in which it may be desired to reduce the temperature of the atmosphere by the introduction of cool or cold air, which I denominate an "atmosphere-cooler;" and I hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a perspective view; Figs. 2 and 3, respectively, vertical longitudinal sections of two forms of chests or receptacles for ice; Fig. 4, a section of the fanners used for giving motion to the air, with the casing in which the same is inclosed; and Fig. 5, an under-side view of the tubes or conductors through and by which cold or cool air is conveyed and distributed to the carcasses hanging in slaughtering-establishments.

The form of ice-chest represented in Fig. 2 is constructed substantially as follows: The length is about the same as the height, and the width one-half the length, made air and water tight, with bottom *b* of loose boards, one-third the distance from bottom to top. A tight partition, *p*, extends from the top to the loose bottom, and another, *p'*, from the loose bottom *b* to *c*. A flattened metallic tube, *t t*, &c., as wide as the box will admit, or a system of small tubes, extends from *a* in the direction of the arrows to *c*. At *o o* are openings or hatches for filling the parts *l l* with ice, and the cold water resulting from the thawing of the ice descends below the loose bottom *b*, and surrounds the tubes *t t*, so that the air which enters them at *a* is somewhat cooled before it passes into the ice-apartment *i* at *c*, and still further cooled in passing down through the ice in that apartment, and under the partition *p*, and up through the ice in the apartment *i* into the pipe P at *e*.

Fig. 3 represents another form of ice chest or chamber, used when it is not necessary to economize by the use of the cold water resulting from the thawing of the ice, of length, width, and depth such as to contain an amount of ice necessary for the work to be done. The air entering at *a'* or at *a''''* is cooled in passing over or through the ice (of which the box should be kept full, or nearly so) before it enters the pipe P at *e*; or an ice-house, where one is at hand, may be so arranged as to supply cool air, in which case a tight covering is made over all or a portion of the ice in such ice-house, as low as the ice will admit, so that the air, being admitted on one side, is sufficiently cooled by being brought in contact with the ice before it passes out at the other side into the pipe P, as at *e*.

Fig. 4 represents common fanners F, inclosed within an air-tight casing, or otherwise directly connected with the pipe B, so that (the fanners being put in motion by a belt on the pulley, or otherwise) all the air they move is drawn through the pipe P.

In Fig. 5, T represents the large pipe, tube, or conductor, overhead in slaughtering-establishments, leading from the fanners; and *t' t' t'*, &c., smaller ones leading from it immediately over each row of carcasses, and in which S S S are slots or openings from which currents of air issue and descend, or are driven upon each carcass, or part of one, as may be desired. At *v* are valves, which serve to shut off the air from the small tubes at pleasure.

Now, the ice being arranged in either of the aforesaid ways, and the fanners put in rapid motion, a portion of air is rapidly cooled and forced through the pipe P' into any place or apartment to be cooled, and there distributed through and from a sufficient number of small perforated tubes, to properly equalize the air thus introduced or distributed to the carcasses hanging in the slaughtering-

house through the system of tubes represented in Figs. 1 and 5, as aforesaid.

What I claim as my invention, and desire to secure by letters patent, is—

1. In an air-cooler or apparatus for cooling carcasses, &c., the combination of a fan-blower, or its equivalent, an ice-chest, or equivalent, and one or more pipes or conduits, which equably dis-
482 tribute the air within the place or apartment to be cooled, substantially as and for the purpose herein set forth.

2. In an air-cooler or apparatus for cooling carcasses, &c., the combination, with the ice-chest, of one or more perforated distributing or equalizing tubes or conduits, substantially as and for the purpose herein set forth.

3. In an air-cooler or apparatus for cooling carcasses by a forced current of air, &c., the ice-chest having an oblong opening at or near its bottom, and extending nearly or quite across the width of the ice-chest, substantially as represented in Fig. 1, for the purpose specified.

4. In an air-cooler or apparatus for cooling carcasses, &c., an ice-chest having an internal partition which is arranged with reference to its inlet *c* and outlet *e*, substantially as shown in Fig. 2, for the purpose specified.

5. In an air-cooler or apparatus for cooling carcasses, &c., the combination of the fan-blower or fanners F, the system of tubes T *t' t'*, &c., and the ice chest or depository in either of said forms, as and for the purpose shown and represented.

MOSES J. KELLY.

Witnesses:
HENRY B. BERGEN.
HENRY B. MASON.

483 [Endorsed:] U. S. circuit court, south. dist. N. Y. Bate Refrigerating Co. *v.* Joseph Eastman. Bill of exceptions. Dickerson & Dickerson, pl'ff's att'ys. U. S. circuit court. Filed Jan. 19, 1886. Timothy Griffith, clerk.

484 Circuit Court of the United States of America for the Southern District of New York, in the Second Circuit.

BATE REFRIGERATING COMPANY, Plaintiff in Error,
vs.
JOSEPH EASTMAN, Defendant in Error.
} Bond for Damages and Costs.

Know all men by these presents that we, Bate Refrigerating Company, of the city, county, and State of New York, as principal, and Amasa Spring, of White Plains, county of Westchester and State of New York, and August Gildemeister, of No. 550 Pacific St., in the city of Brooklyn, county of Kings and State of New York, as securities, are held and firmly bound unto the above-named Joseph

Eastman, defendant in error, in the sum of two hundred and fifty dollars, to be paid to the said Joseph Eastman; for the payment of which, well and truly to be made, we bind ourselves and each of us, our and each of our heirs, executors, and administrators, jointly and severally, firmly by these presents. Sealed with our seals and dated the twenty-eighth day of July, in the year of our Lord one thousand eight hundred and eighty-six.

Whereas the above-named Bate Refrigerating Company has prosecuted a writ of error to the Supreme Court of the United States to reverse the judgment rendered in the above-entitled suit by the judge of the circuit court of the United States for the southern district of New York:

Now, therefore, the condition of this obligation is such that if the above-named Bate Refrigerating Company shall prosecute its said writ of error to effect and answer all damages and costs if it shall fail to make its said writ of error good, then this obligation shall be void; otherwise the same shall be and remain in full force and virtue.

BATE REFRIGERATING CO.
JOHN J. BATE, *President.* [L. S.]
AMASA SPRING. [L. S.]
A. GILDEMEISTER. [L. S.]

Sealed and delivered and taken and acknowledged this 28th day of July, 1886, before me—

GEO. W. MIATT,
[L. S.] *Notary Public, Kings County.*

Cert. filed in N. Y. Co.

485 UNITED STATES OF AMERICA, *Southern District of New York,* } ss:

August Gildemeister, of No. 550 Pacific St., in the city of Brooklyn, county of Kings and State of New York, and Amasa Spring, of White Plains, county of Westchester and State of New York, being duly sworn, depose and say and each for himself saith that he is worth the sum of two hundred dollars over and above all his just debts and liabilities.

A. GILDEMEISTER.
AMASA SPRING.

Sworn to this 28th day of July, 1886, before me—

GEO. W. MIATT,
[L. S.] *Notary Public, Kings County.*

Cert. filed in N. Y. Co.

Bond and sureties approved July 28th, 1886.

JOHN R. BENNETT,
Att'y for Def't in Error.

[Endorsed:] Vol. —, page —. U. S. circuit court. Bate Refrigerating Co., plaintiff in error, *vs.* Joseph Eastman, defendant in error. Bond for damages & costs on appeal. Dickerson & Dickerson, att'ys for plaintiffs in error. Within bond approved as to form and sufficiency of sureties July 30, 1886. W. J. Wallace. U. S. circuit court. Filed July 31st, 1886. Timothy Griffith, clerk.

486 Supreme Court of the United States.

BATE REFRIGERATING COMPANY, Plaintiff in Error,
against
JOSEPH EASTMAN, Defendant in Error.
} Assignment of Errors.

Afterwards, to wit, on the second Monday of October, 1886, in this same term, before the justices of the Supreme Court of the United States, comes the said Bate Refrigerating Company, plaintiff in error, and says that in the record and proceedings aforesaid there is manifest error, in this, to wit:

1. That the court erred in overruling the several exceptions noted in the record herein on behalf of the plaintiff to the admission or rejection of evidence, whereas the said court should have severally sustained said exceptions, and the plaintiff assigns said several rulings as separate errors.

2. That the court erred in hearing and determining, after the introduction of evidence by the defendant and after objection
487 by the counsel for plaintiff, a motion that judgment be entered for the defendant upon the ground that the plaintiff had not made out its case, whereas the hearing and determination of said motion in manner aforesaid was contrary to the law.

3. That the court erred in finding upon the face of the patent and against the proofs introduced by the plaintiff and without any evidence being introduced by the defendant in relation thereto, that the fifth claim of the Kelly reissued patent in suit is limited to an ice-box as a means for cooling the air, whereas said finding was contrary to law.

4. That the court erred in finding that the fifth claim of the Kelly reissued patent in suit cannot lawfully be so construed as to include the devices used by the defendant, whereas said finding was contrary to the law.

5. That the court erred in finding that the fifth claim of the Kelly reissued patent in suit cannot lawfully be so construed as to include the devices used by the defendant for that purpose,
488 even though it might be true that those devices were well-known equivalents for the purpose of cooling air at the date of the original patent, whereas said finding was contrary to the law.

6. That the court erred in finding that the testimony of Henry Morton and Henry C. Brevoort was irrelevant, whereas such finding was contrary to the law.

7. That by the record aforesaid it appears that the judgment aforesaid, in form aforesaid given, was given for the said defendant

in error against the said plaintiff in error, whereas by the law of the land the said judgment ought to have been given for the said plaintiff against the said defendant.

And the said plaintiff prays that the judgment aforesaid, for the errors aforesaid and other errors in the record and proceedings aforesaid, may be reversed, annulled, and altogether held for nothing, and that it, the said plaintiff, may be restored to all things which it has lost by occasion of said judgment, &c.

(S'g'd) EDWARD N. DICKERSON, JR.,
489 *Attorney and Counsel for Pl'ffs in Error.*

Service of a copy of the foregoing assignment of errors and of notice of the filing of the same this 14th day of September, 1886, is hereby admitted.

N. Y., Sept. 14, 1886.

(S'g'd) JOHN R. BENNETT,
Att'y for Defendant and Counsel for Def'ts in Error.

(Endorsed:) Supreme Court of the United States. Bate Refrigerating Company, plaintiff in error, *vs.* Joseph Eastman, defendant in error. Assignment of errors. U. S. circuit court. Filed Sept. 14, 1886. Timothy Griffith, clerk.

490 Supreme Court of the United States.

BATE REFRIGERATING COMPANY, Pl'ff in Error,
vs.
JOSEPH EASTMAN, Def't in Error. } Joinder in Error.

And afterwards, to wit, on the second Monday of October, in said term, the said defendant in error, by John R. Bennett, his attorney, comes here into court and says that there is no error, either in the record or proceedings aforesaid or in the giving of the judgment aforesaid.

And he prays that the said Supreme Court, before the justices thereof, now here, may proceed to examine as well the record and proceedings aforesaid as the matters aforesaid above assigned for error, and that the judgment aforesaid, in form aforesaid given, may be in all things affirmed, &c.

(S'g'd) JOHN R. BENNETT,
Att'y for Def't in Error.

491 (Endorsed:) United States Supreme Court. Bate Refrigerating Company, pl'ff in error, *vs.* Joseph Eastman, def't in error. Joinder in error. John R. Bennett, 237 B'dway, N. Y. city.

Due service of a copy of the within is hereby admitted this 16th day of September, 1886.

E. N. DICKERSON, JR.,
Att'y for Pl'ff in Error.

(File-mark:) U. S. circuit court. Filed Sept. 16, 1886. Timothy Griffith.

492 UNITED STATES OF AMERICA, *ss:*

To Joseph Eastman, defendant in error, Greeting:

You are hereby cited and admonished to be and appear at a Supreme Court of the United States, to be holden at Washington on the second Monday of October, eighteen hundred and eighty-six, pursuant to a writ of error filed in the clerk's office of the circuit court of the United States for the southern district of New York, wherein The Bate Refrigerating Company is plaintiff in error and you are defendant in error, to show cause, if any there be, why the judgment in the said writ of error mentioned should not be corrected and speedy justice should not be done to the parties in that behalf.

Dated July 30th, 1886.

WM. J. WALLACE,
Circuit Judge.

493 [Endorsed:] E. & A. A. 617. U. S. Supreme Court. Bate Refrigerating Company, plaintiff in error, against Joseph Eastman, defendant in error. Citation. [Stamped:] U. S. circuit court. Filed Aug. 4, 1886. Timothy Griffith, clerk.

Service of the within citation is hereby admitted this 4th day of August, 1886.

JOHN R. BENNETT,
Att'y for Def't in Error.

Endorsed on cover: S. New York C. C. U. S. No. 347. The Bate Refrigerating Company, plaintiff in error, *vs.* Joseph Eastman. Filed September 18, 1886.